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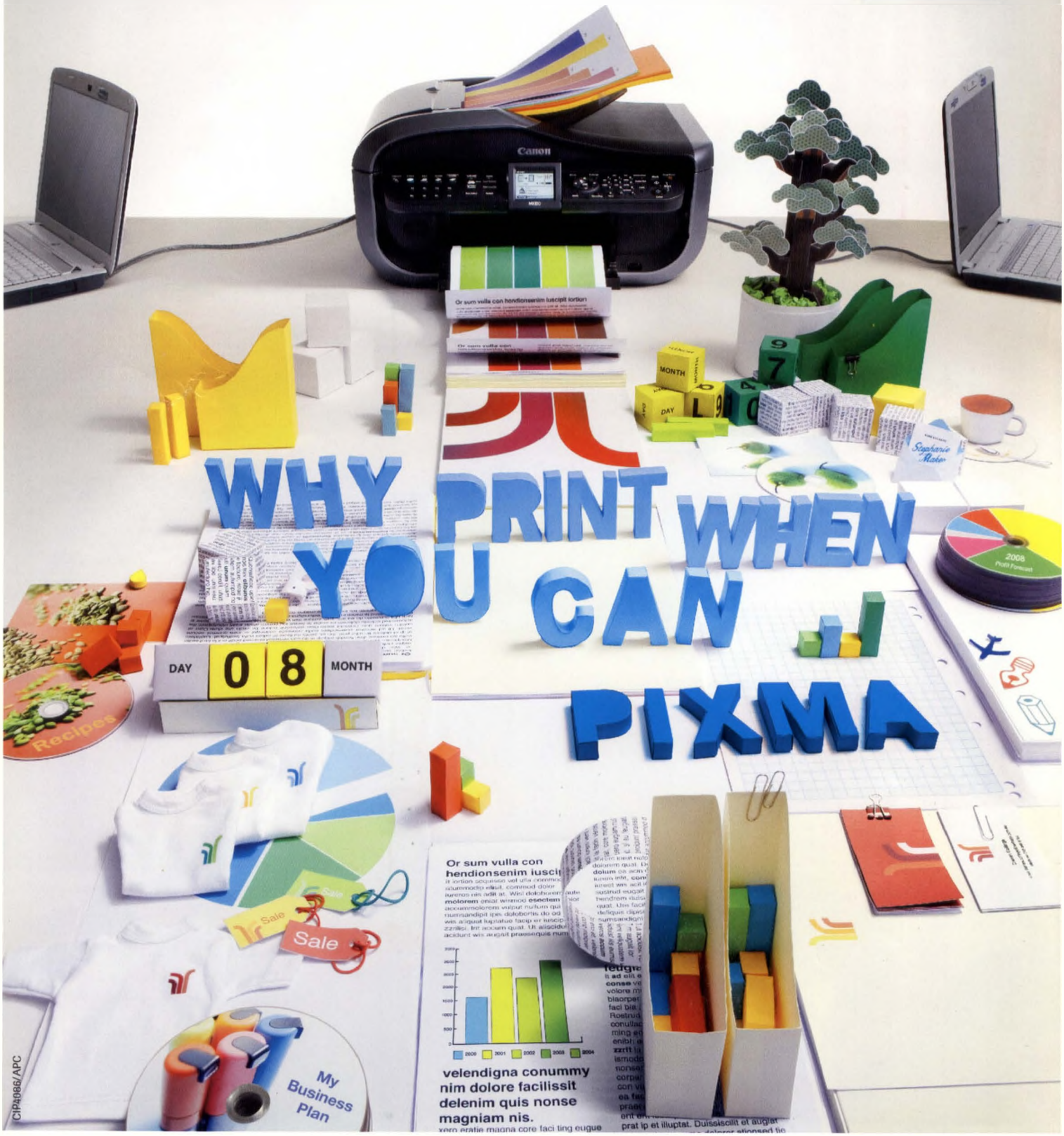

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contents

HANDS-ON WITH HARDWARE AND SOFTWARE

HARDWARE | SOFTWARE | TECHNOLOGY | GADGETS

BEST-VALUE iPHONE PLANS

technotes 06

Editorial	Editorial	06
Technotes	All the latest news	08
Feature	Best-value iPhone plans	12

opinion 19

Opinion	Windows view	19
Opinion	Linux Window	20
Opinion	End User	22

feedback 24

Watchdog	Customer service issues	24
Epinions	Readers' letters	26

08
POWER SAVER!
We tested PCs from around Australia to find out which used the least power. We reveal Australia's greenest computer!

70
SUPERCHARGE WINDOWS
We delve under the hood to reveal how taking command of the Windows kernel for both XP and Vista makes for a slicker PC.

92
SEO OPTIMISATION
Ash Nallawalla walks you through everything you need to know about search engine optimisation.

apc labs 28

Labs intro	Win/Win with greener ways	28
Reviews	Shuttle SD30G2 PLUS	30
	Toshiba Portege R500	31
	Zepto Notus A12	32
	Lenovo IdeaPad U110	33
	XFX GTX 260 XXX Edition	36
	Sapphire HD 4870 GDDR5	37
	ASUS M3N-H/HDMI	38
	Thecus NAS; LaCie NAS	40
	Lexmark X4875; Canon Selphy ES2	41
	Linksys WRT310N Wireless N	42
	Three Internet Key; SMC Router	43
	TiVo HD	44
	Panasonic DMR; OXX Internet Radio	46
	Sennheiser RS130; Wintal PVR2HD	47
	Leadtek DTV200H; Samsung i780	48
	Apple iPhone; Creative Zen Stone Plus	49
	Sony Handycam HDR-TG1E	50
	Canon IXUS 80is, EOS 1000D	51
	Sharp XR-32S DLP projector	52
	Why pay for defrag?	53
Roundup	Super-cheap netbooks	54
Roundup	MP3 Face-off	62

regulars 78

OS Challenge	Look and feel	78
Exploding Tech	Nikon D40 DSLR camera	80
Ask APC	Tech help	82
Masterclass	Search engine optimisation	92

workshops 94

Windows	Boosting shortcuts	94
Virtualisation	Accessible Virtualisation	96
Images	Silverlight photo gallery	100
Webmail	Remote control inbox	104
Online storage	Endless disk space	106
Machinima	Create 3D movies	110

downtime 114

Gear	The coolest tech to watch out for	114
Games	Wii Fit; Mass Effect; MGS4: Guns of the Patriots; Age of Conan: Hyborian Adventures; Boom Blox; Race Driver: GRID	116
Chip Chat	The lighter side of IT news	118

on the dvd

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ADVERTISERS' INDEX

Altech	120, 121
Anyware	119, 122, 123
BandIT	130
Canon	2
CoolerMaster	18
Corporate Software	126, 127
Epson	88, 132
Game Dude	75
Hewlett Packard	61
Hosting Networks	91
Hosting Shop	130
Kaspersky	21
Lenovo	7
MultipliCD	130
PC Tools	77
Pioneer	131
PNY	45
Scorpion Technology	124, 125
TEG	128, 129
Telstra	29
TPG	39
TSN	5
Ubisoft	87
Volkswagen	23

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- DivX for Windows 6.8
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- Exploding Tech Omnibus
- Fedora 9
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- GSpot 2.70a
- IZArc 3.81
- Java Runtime Environment 6 (Update 6) for Linux
- Java Runtime Environment 6 (Update 6) for Windows
- Linux Kernel 2.6.25.9
- Microsoft .NET Framework 1.1
- Microsoft .NET Framework 2.0
- Microsoft .NET Framework 3.5
- Microsoft DirectX (June 2008)
- Mozilla Firefox 3.0 for Linux
- Mozilla Firefox 3.0 for Mac OS X
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editorial

TONY SARNO

I'm very pleased to welcome Ash Nallawalla back into the pages of *APC*. Some of you may remember his name in *APC* a few years ago, before he went on to become one of the world's foremost experts in Search Engine Optimisation (SEO). He is back with a year-long Masterclass on SEO — compulsory reading for anyone running a web site.

The success of a web site these days depends largely on the ranking it can achieve in Google search results (and Yahoo! and Live Search and so on), but few web owners really appreciate the benefits of SEO done properly.

In fact, many sites show a complete lack of understanding of SEO, which is not surprising, because it's actually a complex science. By the end of Ash's Masterclass you should certainly be familiar with the fundamentals of getting your site recognised.

But Ash won't be just all talk. We have provided him with some good raw material — *APC's* new site, APC Pro (**apcmagpro.com**), which is pitched at technology professionals. We built Pro the same way a lot of people build sites: shoot first and ask the SEO questions later, so it will be interesting watching Ash get to work on it.

Now that the iPhone has been released I've been asked a few times when I'll be getting mine and what plan I recommend. The second part of this question is answered by our cover story on page 12, by Jenneth Orantia. The first part is more difficult to answer. The problem I have with the iPhone is more a financial one. If I want to practise any kind of serious mobile connected computing, I would need to shell out for my iPhone (and its 3G connection), and a 3G mobile wireless card for my notebook, not to mention my fixed landline ADSL monthly fee.

Since the iPhone can't be used to provide a mobile connection to my notebook, I'm forced to ask myself, what serious work could I really use it for apart from making phone calls and viewing web sites on a tiny screen without a keyboard?

My solution is to get myself a netbook, which is the latest name for the Eee PC category (following attempts to call the machines sub-sub-notebooks, mini-notebooks, ultramobiles, and even ultralights) with a wireless mobile card. That's it. This will give me remote access to my mail and applications, and of course, full internet access.

In other words, a fully connected device with a real keyboard and reasonably-sized screen that lets me do real work wherever I am. Jenneth, who has been very productive this month, covers the latest netbooks on page 54. As for the phone component, I will keep a basic mobile, although I can use Skype on my netbook to keep in touch with most of my colleagues.

MANY SITES SHOW A COMPLETE LACK OF UNDERSTANDING OF SEO – NOT SURPRISING, AS IT'S A COMPLEX SCIENCE

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LEN 1424/APC

GREENEST PC REVEALED

We tested PCs from around Australia to find out which used the least power. And the winner is...

Edsys Computers, a system integrator from Western Australia makes Australia's greenest PC. Its PC used just 1,384 watts over 24 hours, while achieving a PCMark04 score of 4,422, beating 55 competing PCs.

We picked the winners of the Green PC competition based on the optimal ratio of power consumption to performance. In ratio of the Edsys, was an unbeatable 3:193.

Second and third place winners were CDM Australia and Yukon IT. CDM's PC only used 1,394 watts of electricity over 24 hours but achieved 4,004 PCMarks, while Yukon's machine used 1,169 watts and achieved a PCMark of 2,980. They both had an energy:performance ratio of 2:871 and 2:584 respectively.

By comparison, an ordinary, unoptimised desktop PC — an HP Compaq dc7700p with a Core 2 Duo 6300 and 1GB of RAM on a 965 motherboard — used 1,367.04 watts, while achieving a PC Mark score of 2,313, but a poor ratio of 1:691.

The efforts of the PC makers to build energy-efficient systems didn't always work out. Leader Systems built a powerhouse machine, earning the highest score of the bunch in the benchmark tests, but it also had the highest power consumption — 1,973 watts of power, with a PCMark of 4,933. The resulting ratio of 2:500 was a long way off Edsys' winning ratio of 3:193.

The competition was run by Gigabyte and Western Digital, with *APC* Labs doing the testing on an independent basis. All the PCs were built from parts supplied by both companies.

Gigabyte estimates that using the winning Edsys PC in a business environment would save about $19 per year in electricity costs over an ordinary, unoptimised machine. Multiply that out across a fleet of computers in a business or school, and the costs could add up to hundreds of dollars, or in the case of big PC fleets, thousands.

HOW EDSYS DID IT

While judging the competition, we discovered some interesting things about cutting PC power consumption while still keeping an adequate amount of performance. Primarily, it's a matter of not over-speccing the hardware for your needs (something PC enthusiasts are prone to do, dare we say!)

The heart of the machine was a Gigabyte DES GA-EG31MF-S2 motherboard, which reduces power to the CPU when it's not required. An Intel Core 2 Duo E8400 CPU provided high performance but didn't use any more power than slower processors.

An NVIDIA GeForce 8400GS 256MB graphics adaptor gave good 3D performance, but was also on the low end of the power consumption scale, while Western Digital's GreenPower hard disk drive shaved 5-6 watts of total system power consumption.

Powering the whole lot, an In-Win 80Plus 300W PSU was on duty. Here it's important to note that the 300W power supply was adequate to keep the system stable but was not wasting excess energy. The 80Plus moniker represents the manufacturer's claim that the power supply is at least 80% efficient, reducing the amount of electricity lost to heat.

The system was installed with power saving settings monitored by software called LocalCooling. LocalCooling gives estimates of your power usage and lets the user reconfigure their machine to reduce power consumption and waste with a minimum of fuss. Having good and immediate feedback on the system's energy requirements lets you adjust for power saving without compromising performance when it's required.

The effort paid off for Edsys: Steve Mitchell, Marketing Manager of Edsys, took top prize — a Toyota Prius hybrid electric/petrol car.

Nick Race

HOW WE TESTED

The 55 manufacturers' machines were whittled down to nine finalists, based on the specification of their system, plus other efforts such as recycling programs, both for packaging and old PC systems, carbon-neutral schemes using carbon credits and other more direct means, such as planting trees for each system sold.

The nine final systems were submitted to *APC* Labs for testing, where they were evaluated using a power-to-performance ratio, involving power-testing the machine at various workloads, extrapolating the power draw over a 24-hour day, then comparing the score to the system's benchmarked performance.

Symbian takes on the iphone

As the world's largest mobile operating system seeks to guarantee its future, we discover why everyone wants to make one.

Earlier this year, Nokia bought Symbian — the operating system that powers its smartphones — for US$410 million. The move made perfect financial sense, removing the licensing fees that cost the firm an estimated US$250 million in 2007 alone, but it wasn't just about short-term savings. By forming the Symbian Foundation and giving its members (ie. Sony Ericsson, Motorola, Samsung, LG, TI and Vodafone) royalty-free access to Symbian, Nokia is aiming to take on Apple, Microsoft and Google.

While Apple soars, other manufacturers are struggling. In June, Sony Ericsson issued a profit warning after sales of smartphones in Europe collapsed. Margins are shrinking, the firm told investors, with every chance they will continue to do so.

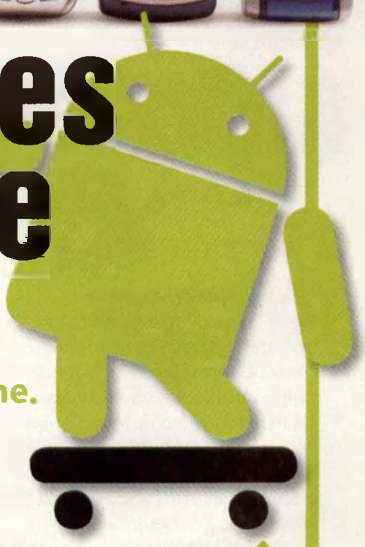
Sony Ericsson's plight will be familiar to anyone who makes PCs: in a slowing market, kit becomes a commodity. Nokia is a hardware firm too, with 40 per cent of global handset sales. In many respects it's the Dell of the mobile world, using its vast purchasing power to hammer down suppliers' prices and keep its costs low. However, you can only squeeze hardware margins so much. The firms with the best software are the ones best placed to prosper.

Analysing iPhone users' behaviour demonstrates just how important software is becoming. Its software and UI are superb — and that means its users do things that they don't do with other handsets. According to Nielsen Mobile, 82 per cent of iPhone owners use the mobile web, 17 per cent stream online music, 20 per cent play online games and 33 per cent use instant messaging — five, seven, nine and three times respectively the usage of the average mobile phone user. In February, Google reported that iPhone users made 50 times the search requests of any other mobile device. All those clicks mean one thing: money.

When there's money to be made, it isn't long before Google turns up. Google has created superb software for its eagerly-awaited range of Android mobile phones. It has brought key partners, including HTC, LG, Samsung and Motorola, together with a who's who of the world's mobile networks and technology firms. While Android has been delayed, there's no doubt that the platform will be a big deal, offering iPhone-style browsing and always-on internet connections across a range of different devices. If Android is good, and every indication is that it will be, it'll be a major rival to existing mobile OSs.

So can Symbian stay ahead of Apple and Android? Nokia certainly hopes so, and the Symbian Foundation should help. However, we suspect that Google doesn't care much either way. If Android rules the roost, it means more people using Google services and seeing Google adverts, but if Symbian ends up doing a better job, Google still wins. Better smartphones means more people Googling, seeing Google ads and making Google money.

Apple's iPhone users are five times more likely to use the mobile web than owners of other smartphones.



For now the only Android product you can get is this rather fetching wallpaper — but come 2009, Android-powered handsets will be widely available.

THE (A)PC REVOLUTION

September 1990

OPEN DESKTOP AN EASY UNIX

UNIX may be the best-suited OS for today's computers, but ironically, many believe it's still unsuitable for business use. Why? The leading complaint is that it's unfriendly. If only someone could simplify UNIX, make it as easy to use as DOS or better still, a Macintosh. Well, perhaps someone has. Enter the Santa Cruz Operation, better known as SCO, with Open Desktop. For just under $1,900, Open Desktop is truly everything you need to get UNIX onto your 386 or i486-based PC.

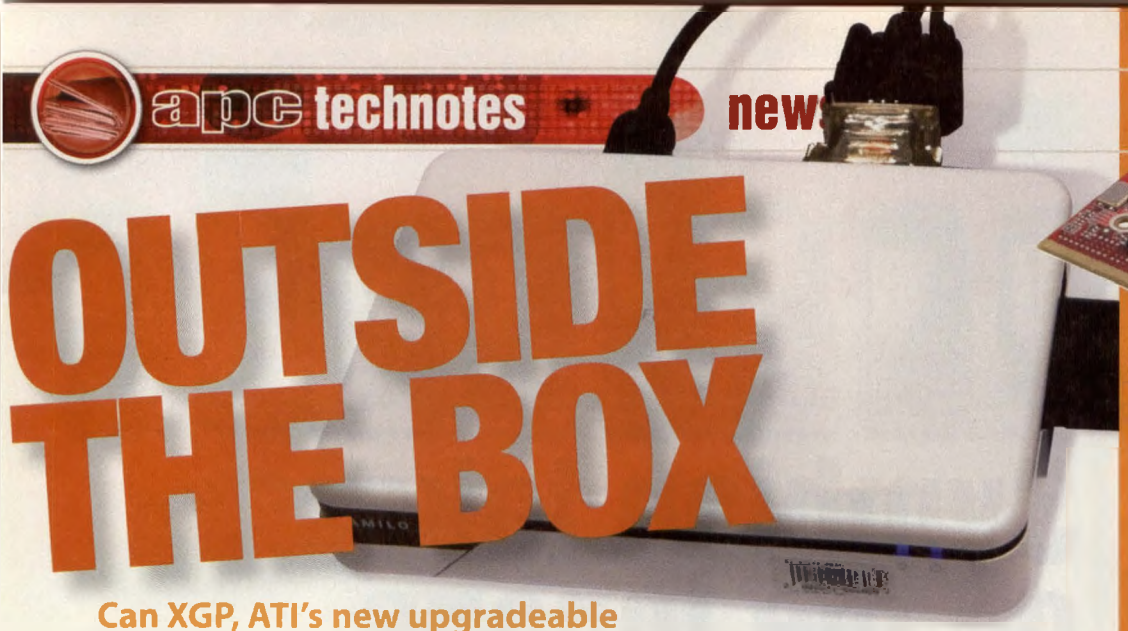
MICROSOFT'S LAN MANAGER TO TAKE ON NOVELL

With LAN Manager 2.0, Microsoft Australia's MD Daniel Petre believes it now has a LAN product that can compete with Novell. LAN Manager 2.0 sits on top of OS/2 version 1.2 on the file server. Is this part of the ploy by IBM to get us all using OS/2? No so, says Petre. DOS is not a suitable host OS for a file server.

DIGITAL'S CURE FOR WHAT AILS DOS

The latest incarnation of DR DOS, Digital Research's MS DOS clone, is an innovative operating system that's thoughtfully designed. Version 5.0 is also packed with the extra features that Microsoft's own OS should have... DR DOS's claim to fame is that it's designed to be easily incorporated into ROM, perfect for use with disk-space hungry laptop computers.

OUTSIDE THE BOX



Can XGP, ATI's new upgradeable laptop graphics system, deliver where others have failed?

The idea of flexible and upgradeable graphics for laptop PCs is nothing new. Various concepts have come and gone, but a truly workable, widely applicable solution has yet to be found — until now. AMD's graphics subsidiary, ATI, has announced a new upgradable graphics platform for mobile PCs that is by far the most promising yet.

The key difference between the new technology — known as XGP (External Graphics Platform) — and previous efforts is the wholesale removal of the high performance graphics subsystem from inside the notebook PC. Instead, XGP houses the GPU in an entirely self-contained, external box, which connects via a single cable to a proprietary graphics port on the notebook. A low-power integrated graphics chip remains inside the laptop to cater for battery-powered usage.

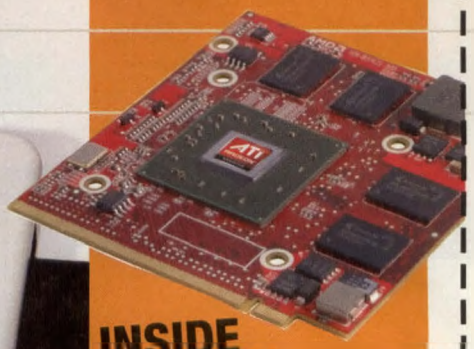
At a stroke, a long list of traditional barriers to mobile graphics performance and upgradability (notably space, power and cooling constraints) are solved. ATI says the cost of including this additional port on new notebooks is trivial. There's one downside, however. As the external XGP box needs its own power source, users will be tethered to the mains when full graphics performance is required.

A typical usage scenario goes like this. Imagine a thin, light notebook; maybe a 14in model powered by a dual-core processor, with integrated graphics and an SSD drive. Plug in the XGP box, connect to an external display and perhaps add a high-capacity USB or network storage solution for a true desktop experience. For now, XGP is a single-GPU solution. However, ATI says multi-GPU XGP boxes with up to four GPUs and massive performance are theoretically possible.

It's an attractive proposition, but it does have one weakness. Initially, XGP is only compatible with AMD and ATI hardware. That's probably acceptable on the graphics side, but we have serious doubts regarding the viability of AMD's Turion X2 mobile processors in the context of a high-performance gaming system.

Intriguingly, AMD says that XGP is compatible with chipsets, CPUs and GPUs from other vendors. Only a licence for its cable and connector technology, and software support, would be required. However, AMD declined to confirm whether royalties would be demanded in return. This leaves the crucial question of market adoption. Will notebook vendors want to offer a tech that makes upgrading more feasible, encouraging owners to hold onto their systems for longer?

Currently, ATI has just one partner — a Fujistu Siemens model, which will be offered with ATI Radeon HD 3800-series graphics in the external XGP box. Retail availability is pencilled in for later this year. Much will depend, we suspect, on the popularity of this first system.



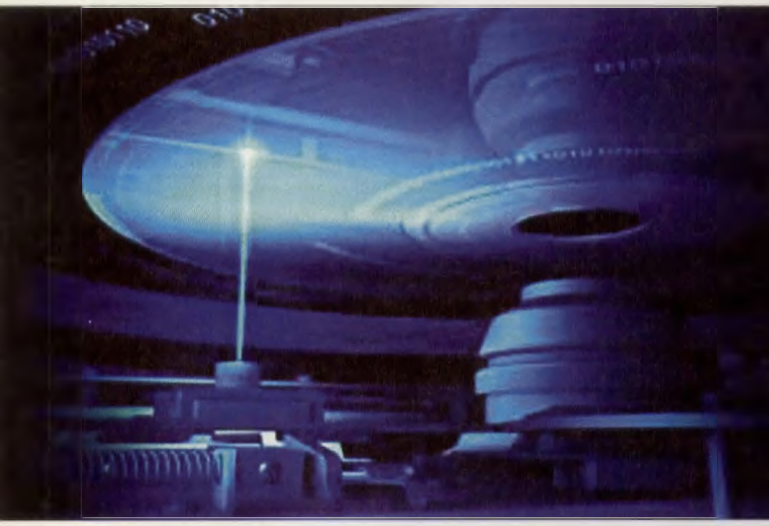
INSIDE THE BOX

For the most part, XGP merely adapts existing technology. The connection between the external graphics box and the laptop PC uses fully PCI Express 2.0-compliant signalling and requires no additional components within the motherboard chipset.

The only items of proprietary hardware, as far as the notebook itself is concerned, are ATI's external PCI Express graphics port and the connecting cable. For now, the external bus is limited to eight PCI Express 2.0 lanes. However, as ATI's GPU and Platform Product Manager, Sasa Marinkovic, points out, that delivers as much bandwidth as a full 16-lane PCI Express 1.0 link.

If you're wondering how XGP sends rendered image data for display on the laptop's integrated display, the data is transmitted over the PCI Express bus to the frame buffer in the laptop's built-in GPU. It's then sent to the LCD panel via the LVDS transmitter.

At launch, XGP supports both this viewing mode and direct connection of external monitors to the XGP box. ATI expects to support connection to external monitors via the laptop's video-out port with future driver releases. Initially, the external boxes themselves will be sealed and non-upgradable. However, Marinkovic says there's nothing stopping vendors from exploring the option of making upgradeable XGP boxes in the future.

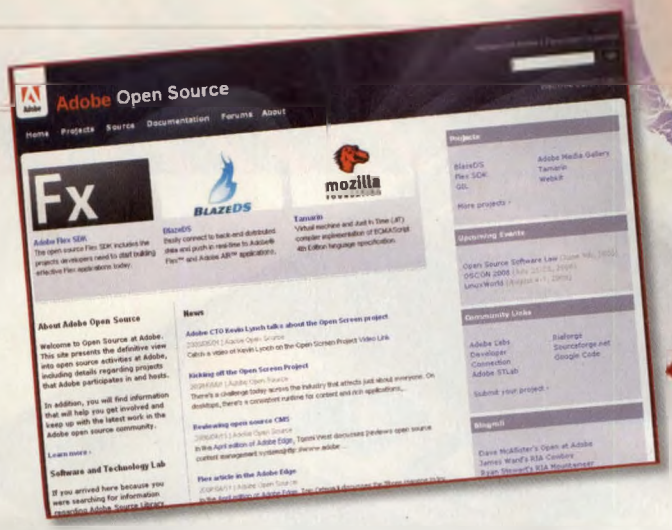


Shining new light on lasers

A new plastic laser diode could revolutionise communications, storage and computing, but at what environmental cost?

Laser diodes, which are used in everything from fibre optic links to optical storage, use alloys such as gallium arsenide, which can be toxic to the environment, and gallium nitride, which is an irritant to eyes, skin and lungs. Now a team led by Professor Donal Bradley from the Department of Physics at Imperial College, London, have succeeded in creating an alternative laser diode using a form of a semiconducting plastic called PFO.

While PFO-based LEDs will readily emit blue light, no-one had been able to make the substance endure the higher currents required by a laser diode to produce enough light for a laser beam. As Professor Bradley points out, "When people tried to develop plastic semiconductors for



Promising to deliver "rich experiences to the widest audience", Adobe's Open Screen Project aims to conquer Java's hold in the mobile marketplace.

FLASH IN PUBLIC

Adobe is removing licence restrictions on mobile versions of Flash. Are there any substantial changes behind the hype?

Adobe has revamped the licensing rules for Flash in a move that will have widespread consequences. The Open Screen Project sets out a number of initiatives — including the removal of licensing restrictions on Shockwave Flash (SWF) and Flash Video (FLV) formats. Manufacturers are now free to build Flash capability into any device, from mobile phones to set-top boxes. Meanwhile, developers should be able to produce Flash content for any compliant device using the most up-to-date code available.

Flash rules the desktop, with the player installed on 98 per cent of machines, but there have been teething problems on other platforms. Although 500 million devices are equipped with Flash Lite, the runtime for mobile platforms, there are more than double that number running Java. Part of the blame for this must be laid at Adobe's door. While the 'mobile and embedded' version of Java has an open GPL-based licence, Flash had a commercial royalty structure. Manufacturers had to buy the licence to include it in their devices, making Java the more attractive option.

The Open Screen Project doesn't just amend licensing for some aspects of the protocol; it removes it completely. SWF and FLV are now completely free to use. The specifications for Shockwave Flash have been open for some time, but now device manufacturers will be able to build their own players — something that was explicitly forbidden under the old rules. There are other changes too. The newly published device porting layer API provides libraries for embedded operating systems, while the Adobe Flash Cast and AMF protocols (which enable data exchange services) are now online.

The biggest switch is yet to come. While the current Flash Player is still covered by the old licensing rules, the next version — which is expected to debut in the final quarter of 2008 — will remove licensing fees for both Flash Player and Adobe AIR. Backing the announcement are a couple of dozen device manufacturers and content providers, including Intel, Sony Ericsson, Nokia and the BBC.

So what do these changes mean for developers? "It's huge," says Serge Jespers, Flash developer and Adobe evangelist. "With the Open Screen Project you should have the exact same runtime on devices as you have on the desktop." Previous versions of Flash Lite have always lagged behind the web version in terms of functionality. Now, when new versions of the runtime are released, devices will update automatically and have the same features as the web version.

With a leap forward in mobile functionality, Flash is hoping to scupper Java's stranglehold. "One thing we're aiming for is a ubiquitous runtime," says Serge. Adobe backs this up with plans to double Flash penetration on mobiles and other devices by 2010.

The Open Screen Project heralds a distinct shift in the device market. However, even with all the power of Flash and its advocates, it remains to be seen whether Java can be toppled from its perch.

laser diode use, they found that optimising the material's charge transporting properties had a detrimental effect on its ability to efficiently emit light, and vice versa." By making subtle changes to the structure of PFO, however, Bradley's team has managed to increase its ability to handle currents by 200 times, as well as increasing its ability to produce a coherent beam of light.

NEW WAVELENGTHS

It has proved very difficult to make existing alloy laser diodes emit light of certain wavelengths, but, in theory, the new plastic versions can emit a beam of light ranging in frequency from the near infra-red through the visible spectrum to near ultraviolet.

Consider the capacities of normal DVDs and Blu-ray discs, for instance. Only 245 nanometres separate the wavelengths of red and blue lasers, but the result is a six-fold increase in data storage capacity. Similarly, fibre optic links can handle many different frequencies of light simultaneously without them interfering with each other, but only if the diodes used can emit the required frequencies. The wider wavelength range of plastic laser diodes could soon result in far higher communications capacities, using existing fibre optic links. They could also bring super-fast optical computing tantalisingly close.

Once they become cheaper and easier to produce than conventional alloy-based laser diodes, the hope is that plastic laser diodes will quickly replace traditional devices in a wide range of electronic products.

Is there an environmental cost to using plastic semiconductors? As made by the Sumitomo Chemical Company in Japan, the new form of PFO used in the diodes doesn't use arsenic. However, their manufacture does require other noxious chemicals, such as toluene. If plastic semiconductors become popular, future manufacturers will need to weigh the benefits of yet greater data storage capacity and faster optical communications against a need to protect the environment from the by-products of the fabrication process.

HOW A LASER DIODE WORKS

Physically, a laser diode resembles a normal LED, which is made from two pieces of semiconducting material sandwiched together between electrodes. Electrons, repeatedly excited by a current applied across the device in the right direction, quickly give up their extra energy in the form of photons. In a laser diode, this happens inside a special central cavity with a mirror at each end. At one end, the mirror is only half silvered and some of the light can escape. This, focused by a lens, forms a laser beam.

BEST-VALUE iPHONE PLANS

Unsure of the iPhone plan that's right for you? Whether you're an average user, executive, mobile worker or student, *Jenneth Orantia* takes a look at the plans right for your specific needs.

By now, you probably know at least one person that's gotten their hands on Apple's shiny new iPhone 3G. And, like any self-respecting techie, you've succumbed to its sexy hardware design and irresistible set of features. Wi-Fi, HSDPA, A-GPS, 8GB or 16GB flash drive, 3.5-inch touchscreen with multi-touch technology — what's not to like?

But if you think making the decision to buy one was the hardest part of the process, think again. Telstra, Vodafone, Optus and Virgin Mobile are the four carriers sanctioned by Apple to sell the iPhone 3G in Australia, and each have come up with a set of plans specific to the iPhone. In other words, if you want to buy an iPhone 3G on a contract, your choices are limited to these plans in particular.

Optus is the only carrier currently offering the iPhone on a prepaid plan, but you'll have to shell out a fair bit of money up-front: $729 for the 8GB iPhone 3G and $849 for the 16GB iPhone 3G. They're also locked to the Optus network; to unlock it within the first six months of activation, you have to pay an $80 unlocking fee if you haven't already bought $80 worth of credit, in which case it can be unlocked for free.

Still, it's cheaper than buying it outright from Telstra, the only other carrier that offers it off-contract. Through Telstra, the iPhone 3G is $723 for the 8GB and $847 for the 16GB, but the unlocking fee is almost double at $150.

Once it's unlocked, you can use the iPhone with a prepaid or postpaid plan from any carrier, but to sway you over to 3 Mobile, the 3 network has come up with new 3G SIM and Data Starter Kits tailored specifically for unlocked iPhones, starting at $49 for $350 worth of calls and text and 1GB of data, plus a sign-up bonus of $300 worth of credit to be used within the first month.

Telstra doesn't offer any cap plans for the iPhone 3G, so when it comes to all-round value, Vodafone, Optus and Virgin Mobile are the three main contenders for getting an iPhone on a contract. For calls and text, Vodafone generally offers more credit in its cap packages and cheaper call rates (although Virgin Mobile's Free to V Cap $70 includes more credit than Vodafone's $69 Cap Contract), but once you add data to the equation, Optus and Virgin Mobile come out ahead.

If you end up using all your data, Vodafone is the kindest with its excess usage fees, charging 12c per megabyte. Optus charges 35c per megabyte, Telstra charges $2 per megabyte if you haven't added a browsing pack to your plan (and a descending scale of fees starting at $1 a megabyte if you do have a pack), and Virgin Mobile charges a whopping $15 a megabyte.

Optus and Virgin Mobile may offer the best value for general usage, but Telstra isn't completely out of the running. Its NextG network has the widest coverage of all the 3G networks, encompassing 99% of the population. Plus, all of Telstra's iPhone 3G plans include free unlimited access to its network of Wi-Fi hotspots, which are found in over a thousand locations Australia-wide, including most McDonalds and Starbucks.

Finding the best iPhone plan for your needs isn't as black and white as choosing the one with the most credit. Depending on your usage patterns, you may get more value out of being on the same network as all of your friends, having more data included in your monthly allowance, getting the best high-speed coverage Australia-wide or having free access to wireless hotspots. We've sorted through all of the iPhone plans on offer and recommended plans for particular types of users, so if you're ready to upgrade your mobile to an iPhone 3G, read on to find the plan that best suits you.

iPHONE PLANS FOR AVERAGE USERS

You've probably had a mobile phone for years, so you should have a good idea of how much you typically spend for calls and text messages already. The iPhone 3G adds data to the equation, and if you've never done any web browsing or email on your mobile, this is the area that can trip you up when you're shopping for an iPhone plan.

The first thing to know is that the iPhone's internet functionality can quickly become addictive, between browsing the web using the excellent Safari browser, looking up addresses and nearby points of interest in Google Maps, streaming video clips from YouTube, downloading email and using some of the third-party iPhone applications like Facebook, MySpace Mobile, TypePad and Twitterific.

But unless you're streaming loads of YouTube videos a day (which works out to be around one megabyte per minute) or making heavy use of Google Maps in satellite view, 200MB should be more than enough for using all of the iPhone's online applications without worrying about excess usage fees (which we covered on page 12). When you factor data in, Optus and Virgin Mobile have the best value plans by far, combining large data allowances with generous cap values.

If you're happy to pay for the iPhone up-front, you can get better deals on Optus' prepaid TurboCharge caps, with larger data allowances and more credit for calls and SMS. Also, if you sign up for one of Optus' prepaid plans, you get a bonus startup credit of $400 and 1GB of data to use within your first month of connection. Another option is paying the $80 unlocking fee and switching over to one of 3's 3G SIM and Data Starter Kits, which, compared to all the other carriers, offer the most credit and data in each plan.

Average number of calls

Light 3G web use

Best mix of call credit and data

1 Optus Prepaid $50 TurboCharge Cap

Optus' mid-range $50 TurboCharge Cap offers the best mix of credit and data. You get $330-worth of credit (split between MyCredit and MyBonus: you can use all of that for calls, text and voicemail, but you're limited to the $50 of MyCredit for premium SMS and international roaming), $50 of MyTime money (which you can use for calling any five nominated Optus mobiles or landlines) and 500MB of data. Calls are charged by the minute at 78c a pop (plus a 35c connection fee), so you'll get the most out of your credit by keeping calls close to a minute.

'yes' OPTUS

2 3 3G SIM and Data Starter Kit $49 Cap

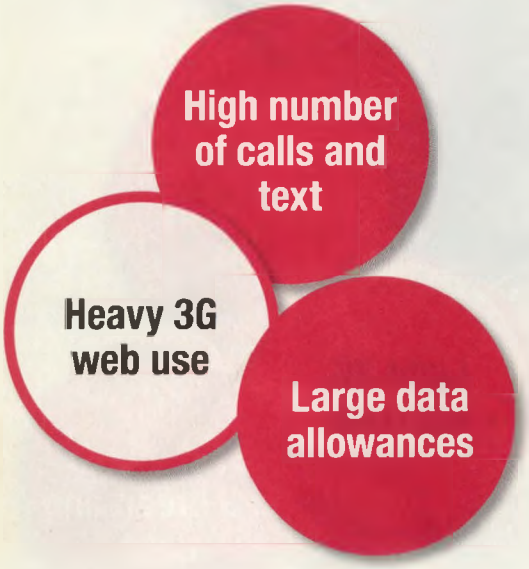
If you're happy to go through the process of buying an iPhone prepaid through Optus, paying an $80 unlocking fee (or buying $80 of prepaid credit), and waiting 10 days for the unlock to take effect, your efforts will be well-rewarded at 3. The $49 Cap includes $350 of calls and SMS, $240 worth of calls to anyone else on the same network, and 1GB of data that can be used within 3's Broadband Zones, which are in most parts of Sydney, Melbourne, Brisbane, Adelaide, Perth, Canberra and the Gold Coast. Outside of those areas, data costs a stinging $1.65/MB.

3 Optus Postpaid $59 'yes' Cap Plan

$729 for the 8GB iPhone 3G and $849 for the 16GB iPhone 3G is a lot of money to spend on a phone up-front. Optus provides the best subsidies for the iPhone if you sign up for a 24-month contract, and if you don't mind paying a bit more, Optus is also the only carrier that offers the iPhone on a 12-month contract. The $59 'yes' Cap Plan includes $350 of credit for calls and texts and 500MB of data. Repayments for the 8GB iPhone are $32 for 12 months or $2 for 24 months, while the 16GB iPhone is $42 for 12 months or $7 for 24 months.

'yes' OPTUS

iPHONE PLANS FOR WEB USERS



It's easy to get carried away with the idea of consuming large gobs of data on your iPhone, but the truth is that it's difficult to go through more than a gigabyte a month. The iPhone 3G doesn't support tethering to a laptop for use as a mobile broadband modem, you can't download files directly to it, and even songs and albums bought through the iPhone's iTunes application can only be downloaded over a Wi-Fi connection.

That said, there are ways to chew through your data allowance at a rapid clip. Streaming YouTube videos is the biggest drain, taking up nearly a megabyte a minute, and other data-heavy applications include viewing Google Maps in satellite view and streaming internet radio stations.

If you're happy to do most of your web browsing and YouTube streaming over public Wi-Fi hotspots, both Optus and Telstra offer free access to Wi-Fi networks on their postpaid plans, but Optus' coverage is limited to a measly 56 locations, a third of which are located in Martin Place and Moore Park in Sydney. Telstra's Wi-Fi network is more promising, with 1,119 locations that include Starbucks, McDonalds, Borders, Rydes Hotels and all of the national airports.

Most of the iPhone plans combine large data allowances with a big cap value for calls and text, but what if you don't do much of the latter? You can save a lot of money by buying the iPhone prepaid from Optus, paying the $80 unlocking fee, and using it with one of the high-value data deals that we cover below. You'll need to change the APN that the iPhone uses to match the carrier that you switch to, and this setting can be found in Settings > General > Network > Cellular Data Network > APN. If the setting isn't there (because it's been locked to a particular carrier), you can use the APN configuration tool at **www.unlockit.co.nz** to set a new APN on your iPhone.

1 Vodafone 5GB $39 Mobile Broadband

This plan comes with a free USB modem (worth $299) when you sign up for 24 months, and the SIM card works perfectly in an unlocked iPhone 3G. To get data working, you'll need to change the APN on the iPhone to vfinternet.au. Calls are charged on top of the monthly $39 access fee at 1c a second with a 20c connection fee, text messages are 25c each, and excess usage is 10c a megabyte. As you can also use the plan for internet access on your laptop using the supplied modem (which is what it's actually designed for), you're more likely to use up the entire 5GB quota.

vodafone

2 3 $69 Cap 3G SIM & Data Starter Kit

3's $69 3G SIM and Data Starter Kit offers incredible value at this price range, with $650 of calls and SMS, $350 (or 500 minutes) of calls to other 3 users, and 2GB of data a month, with excess usage fees a reasonable 10c a megabyte. The catch is that you need to be within one of 3's Broadband Zones to use your data allowance, which currently covers the metro areas of Sydney, Melbourne, Brisbane, Adelaide, Perth, Canberra and the Gold Coast. Outside of those areas, you roam onto the Telstra network and have to pay a $1.65/MB on top of your access fee.

3 Virgin Free to V Cap $100

Offering 5GB of included data a month, the Free to V Cap $100 has the largest data allowance of any of the iPhone plans by far. Both the 8GB and 16GB iPhones are free on this plan, and it also comes with $520 of credit for calls and texts to use when calling non-Virgin Mobile users (all intra-network calls and SMS are free). Not that you're likely to go over your limit with 5GB to play with, but it's worth pointing out that Virgin Mobile also has the most expensive excess usage fees: 1.5c a kilobyte, which works out to be a hefty $15 a megabyte.

Virgin mobile

High number of calls and SMS

Heavy 3G web use

International coverage

iPHONE PLANS FOR EXECUTIVES

The addition of HSDPA, GPS and the App Store may be the iPhone 3G's main improvements for consumers, but from an enterprise perspective, the big news is support for Microsoft Exchange ActiveSync. This makes the iPhone 3G a viable option for those needing push access to email and calendar on the road, and puts it in the same class as smartphones that run the BlackBerry, Windows Mobile, Palm and Symbian operating systems.

If your job involves a lot of travelling, national and international coverage can take priority over a plan's value-for-money. Telstra's NextG network is more than twice as large as any of the other 3G networks in Australia, covering 99% of the country's population, which means better coverage both inside and outside of the metro areas.

When it comes to international coverage, data is the real killer, and you can easily rack up a bill of several hundreds of dollars by simply keeping your push email active. Vodafone offers the best deals for business travellers with its Roaming Data Bundles, which you can add onto any MyBusiness Cap plan for the month you'll be overseas. This covers 38 countries, including USA, UK, Singapore and China, and consists of a $49 plan for 25MB of data and a $199 plan for 120MB of data.

Otherwise, you can simply pay 1c a kilobyte (or $10 a megabyte), which is still better than the Optus and Telstra roaming data rates. Optus charges 2c a kilobyte (or $20 a megabyte) as its casual rate for roaming data, but if you roam onto one of Optus' partner networks, this goes down to 1.5c a kilobyte. Optus also offers two data plans for use on any of its partner networks overseas: $40 per month for 15MB and $80 per month for 40MB.

Telstra doesn't have any roaming data plans, so you're stuck with paying 1.5c a kilobyte (or $15 a MB) for using your iPhone's data connection overseas, plus 50c for each new data session. Virgin Mobile's global roaming rates differ depending on the country you're going to, but unless you've paid your last three bills on time and don't have any bills outstanding, you'll have to pay $250 up-front before you can get roaming activated.

1 Optus 'yes' Timeless Plan $129

If your phone bill is regularly in the hundreds of dollars, you can limit your spend to a predictable $129 a month by signing up for Optus' $129 Timeless plan. This is the first plan in Australia that offers unlimited calls to landlines and mobiles, unlimited text messages and unlimited voicemail retrieval for a single flat fee, and it also comes with 3GB of data. As the plan isn't specific to iPhones, you could also use that data in another mobile and put it to good use as a tethered modem for your laptop. Both the 8GB and 16GB iPhones are free on this plan.

'yes' OPTUS

2 Vodafone My Business cap $119

Travel internationally on a regular basis? Then the Roaming Data Bundles available with Vodafone's MyBusiness Cap plans will let you leave the laptop at home and use your iPhone for email and web browsing instead. The MyBusiness Cap $119 includes $800 of credit for calls and text and 500MB of data, plus business bonuses like Mobile Office (unlimited free calls to up to four people on the same account), cheaper Vodafone-to-Vodafone calls, and a customer care team dedicated to business users. As for the iPhone, it's $59 up-front and $179 up-front respectively.

vodafone

3 Telstra $350 iPhone 3G plan

The lack of capped plans in Telstra's iPhone 3G offering means you'll have to pay almost four times as much to get the same value — but you'll be able to access 3G in more locations. The $350 plan includes $335 of calls and texts and $15 of data, and call rates are cheaper than the other carriers at 18c per 30 seconds. Add on a $29 browsing pack for 300MB of data, and you're looking at $409 a month. The up-shot is that both iPhones are free on this plan, and you get unlimited access to Telstra's extensive wireless hotspot network.

Telstra

iPHONE PLANS FOR BUSINESS & WORK

High number of calls and text

Heavy email and web use

High-value call plans

If you spend more time out of the office than in, you'll want a high-value call plan with enough data to check email a few times a day and cover the occasional web surfing session and address look-up in Google Maps.

Surprisingly, business users don't get many perks compared to general users. Telstra and Virgin Mobile don't offer any business-specific iPhone plans, and while Optus has supposedly developed iPhone plans for small and medium business users, these are identical to its consumer plans. Likewise, Vodafone has the same caps, call rates and handset prices on its business and consumer plans, but for business users, it offers the Mobile Office feature (which lets up to four users on the same account make unlimited free calls to one another), cheaper rates for intra-network calls (17.5c per 30 seconds plus the 30c connection fee, compared to 40c per second and the same connection fee for consumers) and a dedicated business customer care team to take care of any support issues.

Optus has a 'Free for 5' bonus similar to Vodafone's Mobile Office, but it's available on all of Optus' postpaid plans rather than being exclusive to business users: up to four users on the same account can make free five-minute voice calls to each other 24/7. Virgin Mobile goes one further by making all calls and SMS between users on its network free.

Virgin Mobile and Optus are neck and neck when it comes to value for money: Virgin Mobile offers 1GB of data and $520 of included credit with its Free to V $70 cap, while Optus has $550 worth of calls and text and 700MB of data in its $79 'yes' Cap Plan. That said, the wider coverage of Telstra's NextG network may be the clincher for workers that regularly travel outside of metro areas.

1 Virgin Mobile Free to V Cap $70

Launching the iPhone 3G a full three weeks after everyone else has enabled Virgin Mobile to come up with an extremely competitive set of plans. The Free to V Cap $70, available on a 24-month contract, includes $520 worth of calls and text and a generous 1GB of data, plus calls and SMS to other Virgin Mobile users are free. The 8GB iPhone 3G is free on this plan and the 16GB iPhone 3G costs an extra $4 a month. The sting in the tail is Virgin Mobile's excess usage fees, which are charged at 1.5c a kilobyte — or $15 a megabyte.

2 Optus $79 'yes' Cap Plan

It offers less data than the Virgin $70 plan, but if your main concern is email and a bit of browsing, 700MB should be plenty. Included in the plan is $550 worth of calls and text, 700MB of data and unlimited SMS, and you get the 8GB iPhone free on a 24-month contract (the 16GB iPhone is $2 a month over 24 months). Other perks include free access to Optus Wi-Fi hotspots (located mainly in Martin Place, Fox Studios and Sydney Airport in Sydney, and a handful of locations in other states), the Optus 'Free for 5' deal and free calls to other Optus mobiles from 8pm to midnight.

3 Telstra iPhone 3G $90 Package

Telstra's $90 plan only offers $70 worth of credit and $20 worth of data (which equates to 170MB), but it's the hidden extras that make it worthwhile. The 8GB and 16GB iPhones cost $0 and $69 respectively up-front, and the plan includes free unlimited access to Telstra's Wi-Fi hotspot network (which at last count included 1,119 locations around Australia). One of the bonus options on offer is Free 24/7, which lets you specify any Telstra mobile or fixed line for free three-minute calls to that number — ideal for calling back into the office.

Check APC's iPhone plan upates at ***tinyurl.com/69r5et***

iPHONE PLANS FOR TEENS/STUDENTS

If you're a teenager or student with limited income, your best option for getting an iPhone 3G is on a prepaid plan. So far, Optus is the only carrier offering the iPhone 3G prepaid, but the up-front cost isn't cheap. For the 8GB iPhone 3G, you're looking at $729, and the 16GB will set you back $849. Plus, there's the cost of the prepaid card, which starts at $30.

Chances are that most of your friends are with the same carrier to take advantage of cheap intra-network voice and text deals, and many of these are also on offer for post-paid iPhone 3G plans. Optus has Yes Time, which gives you free calls for the first 20 minutes to other Optus mobiles from 8pm to midnight every day. This includes calls to Optus subsidiaries like Virgin Mobile and Soul, but it doesn't work the other way around (Virgin and Soul users can't call you for free).

Vodafone lets you choose one out of six bonus offers for its iPhone 3G plans, two of which are handy if most or all of your mates are on the Vodafone network: Unlimited free calls for your Best Vodafone Mate and 100 free Vodafone to Vodafone minutes. Telstra offers Free 24/7, which lets you specify one Telstra mobile or fixed line that you can call for free for the first three minutes, and Free Text, which lets you send 200 free SMS to any Telstra mobile between 8pm and 7am. Finally, Virgin Mobile lets you make unlimited calls and texts to other users on the same network, subject to a Fair Use policy.

High number of calls and SMS

Average 3G web use

Pre-paid is the way to go

1 Optus Prepaid $40 TurboCharge Cap

This isn't Optus' most affordable TurboCharge Cap plan, but it's the cheapest one that includes data in the package. For $40 per recharge, you get $220 worth of calls and text, $40 of MyTime money and 50MB of data. The $40 MyTime credit can be used for calling five nominated Optus mobiles and landlines, and it works out to be around 14 three-minute phone calls. It's worth noting that calls are charged by the minute (78c, plus a 35c connection fee per call), so if you talk for 1 minute and 1 second, you're charged for the full two minutes.

'yes' OPTUS

2 Optus Postpaid $19 'yes' Cap Plan

The up-front cost for the iPhone 3G on prepaid is a lot of money, so if you're able to sign up for a contract, Optus offers the best subsidies for paying off the phone over a 24-month term. On a $19 cap (which includes $50 of credit and 100MB of data) you pay $21 extra a month for the 8GB iPhone and $26 a month for the 16GB iPhone. This works out to $40 or $45 a month respectively, which is a lot easier on the finances than the $19 cap on a 12-month contract, which comes to $70 a month for the 8GB iPhone and $80 a month for the 16GB iPhone. Ouch!

'yes' OPTUS

3 Telstra iPhone 3G $40 Package

Telstra offers a compromise between paying a large sum for the phone up-front or paying it off in installments. On its $40 plan, you pay $279 for the 8GB iPhone and $399 for the 16GB iPhone up-front, and thereafter you only have to worry about the $40 monthly charge for the next 24-months. You don't get a lot of value though, $25 worth of credit for voice and text and $15 worth of data (equal to 160MB), but you can do get Telstra's My Hour bonus, which lets you get the first 20 minutes of calls to any fixed or mobile numbers free for any hour in the day or night you nominate.

Telstra

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King of the universe

Comparing Windows to Linux and Mac is like comparing Jupiter to a couple of its moons: interesting, but not in the same league.

Worlds apart: Windows and the other guys.

If you knew nothing about the distribution of desktop software except for what you read in IT publications, you'd be convinced that there are three main players — Windows, Mac and Linux — all vying for superiority in the cut-throat world of consumer computing. And you'd be wrong. If publications allotted space based on the real distribution of desktop operating systems, then nine out of every ten pages would be about Windows. The remaining one page would be split between Mac and Linux.

It's not stretching the truth to claim that Windows is the world's OS. Of course, there are environments where Windows never sees the light of day, but these areas are, like the operating systems which are generally to be found in them, niche.

Conspiracy theorists might start wondering whether their favourite IT magazine or web site has some sort of hidden agenda, or whether the publishing industry as a whole is trying to downplay Microsoft's market share by pretending it's not as big as it really is. The truth is, as ever, far more mundane. Publications like to try and be as fair as possible to all elements of their readership and cover all the bases. And if they didn't, left to their own merits some products would never see coverage in mainstream media.

Additionally, some people tend to get very irate and write in if they feel their particular hobbyhorse isn't getting enough attention.

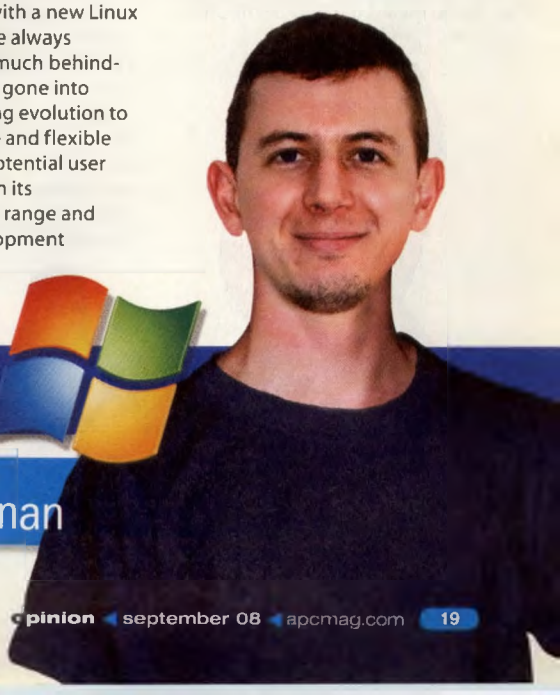
MARKET DOMINANCE

Windows' position in the world is quite unique. To be sure, it has achieved its dominance through a very long and sustained process of clever marketing and product positioning, aggressive licensing and other less-than-savoury practices, but none of these would be sufficient if they were backing a product which didn't work. But Windows does work. Very, very well.

One of the reasons why it may seem that Windows is being compared equally to the other operating systems is due to a perceived homogenisation of the user experience. Superficially, Windows, Linux and Mac look and feel approximately the same. If you can use a mouse you can find your way around, more or less. Where it starts to get interesting is when a user is called on to do something which requires platform-specific knowledge, like update a driver, set up secured wireless networking or install a new application. With Windows, you're not reduced to trawling through online forums or recompiling source code just to get a bit of basic functionality.

Something which doesn't get talked about much is skill transference — being skilled on one particular platform doesn't necessarily make you skilled in another. Or even vaguely proficient. When I have a play with a new Linux distro the experience always highlights just how much behind-the-scenes work has gone into Windows over its long evolution to make it so accessible and flexible within a myriad of potential user scenarios. Linux, with its fragmented product range and multi-headed development strategies, is simply not in a position to compete at this level. And Mac is, well, shiny and happy and niche, niche, niche.

This is nowhere more apparent than in business. When trying to get a foot in the door and oust Windows as the preferred platform in any environment, Linux and Mac are crippled by the massive retraining necessary to make the proposed new system viable and productive. It's not an indictment on the quality of their products, but simply that Linux users still have to be very good at Linux, Mac users still have to be good at Macs and that's enough to keep these products out of Windows environments. And that's not going to change in a hurry. apc



Window's view

James Bannan is a systems manager at St Leonard's College (Vic) and APC's resident Windows expert. He'll be checking out Vista for you every month.

by James Bannan

Don't forget about KDE

Of late, the Gnome environment has seemed to be the environment of choice. In the hype surrounding Ubuntu, it's easy to push KDE to one side.

Ubuntu's success has catapulted the Gnome environment to the forefront in the mind of Linux desktop users. And with good reason — it's clean, simple and easy to get into. Just what you need when you want to attract Windows users too.

But even though Gnome is popular, there was a time when KDE was the golden child. Granted KDE had a stronger focus on configurability (your average KDE application has a wealth of menu options, not that you'll regularly use them all), but this wasn't the reason Ubuntu's developer Canonical didn't go with it. Ostensibly, Canonical wanted a completely open solution, and the Qt toolkit underlying KDE is a proprietary one — well, after a fashion. Although in 1998 the KDE Project and Trolltech (the authors of Qt) founded the KDE Free Qt Foundation to ensure that even if Trolltech should disappear, KDE would have the right to keep using and develop Qt, in 2004 when the first official Ubuntu was released (4.10, aka 'Warty Warthog) Qt still wasn't available under the GPL. That happened in 2005.

Today, and although Ubuntu is by no means the only distribution to have chosen Gnome, it's certainly thrust the environment into the limelight.

KDE shouldn't be forgotten, you don't need to use all of it, just pick the applications you want.

It's easy to forget that the current version of KDE (version 3.5.9) is as feature-rich (and in some areas, more so) than Gnome and — granted, in my opinion at least — although it still likes to deluge the user in configurability, there have been plenty of times when I've bemoaned the lack of options in Gnome. And so, if you love Gnome and Ubuntu but wish it was just a teeny bit more flexible — don't forget there's always KDE.

As it happens there are many popular KDE applications which Gnome users often use anyway — Amarok, for one, which is arguably the best music player/manager/streamer/everything on *any platform anywhere* (install it now if you haven't already), so even if you don't use the whole environment, you can still use the applications.

It's interesting to note that KDE 4.0 is such a rapid departure. On the one hand it's a bold step forward in creating a new environment unlike the previous KDE, Gnome, XP or Vista. Perhaps too different for some Linux users to accept, at least at this stage — the developers admit it's not production quality yet and currently lacks some key features. And on the other hand this gives KDE two unique environments for the moment which — funnily enough as a result — means more choice (it's like we're back to options and configurability again).

And choice has always been a strength of Linux. So if you haven't so far tried KDE, are looking for a change, or just want to see what the other side of the *popular* desktop environment fence looks like (and there are *many* other alternatives) give it a go — use a Live CD, even.

Ubuntu may have chosen Gnome, but there are quite a few very popular distributions that use KDE as a base. These include OpenSuse (**www.opensuse.org**); PCLinuxOS (**www.pclinuxos.com**); Mandriva (**www.mandriva.com**); Vector Linux (**http://vectorlinux.com**); Kubuntu, of course (**www.kubuntu.org**); and indeed, Xandros (**www.xandros.com**) — a modified version of which powers the Eee PC.

And if you want something different (and lighter) still than either Gnome or KDE, look up XFCE (**www.xfce.org**) — but I'll save that for another issue.

LinuxWindow

by Ashton Mills

Editor of the **Linux Pocketbooks** *series, and now with CHOICE magazine, Ashton has been a tech journo for over 13 years, including five years with APC.*

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Dumb user's best friend

When things go wrong in Word and end users panic, one simple undo command can save the day.

Joanne Robinson was working in the IT call centre of a large government department in Queensland when she received this call. The caller's name has been changed.

JO: Government Dept. help desk, how can I help you?

Jane: This is Jane Smith, I'm the supervisor of this department. One of my workers has lost an important document and we need access to the backup tapes immediately.

JO: Well, I might be able to help, what program was he using...?

Jane: (interrupts) No, we don't have time for this, this is a very important document, we just need to access the backup tapes!

JO: I understand, but in order to do that I need to log a job, what program was he using?

Jane: Microsoft Word — look, we just need the backup.

JO: And what exactly happened?

Jane: We don't know! It's just all gone!

JO: Is Word still open?

Jane: (frustrated sigh) Yes, can you just organise access to the backup?

JO: Sure, I just want us to try something first, get him to hold down the control button and press Z.

Jane: It worked! It's all back! What happened?

JO: Ctrl+Z is the undo function.

SILLY COMPUTER MUM

Kevin Roati's mum decided to take computer classes to try and get better with computers. Kevin, who's from Cairns, Queensland, recalls that she started getting homework to do on the computer at home. "So I saw her start her homework that night. I left her and came back about 30 minutes later to find her really stressed out. I asked her what was wrong and she shouted at me, "I CAN'T FIND THE START MENU!"

THE EXPERT BOSS

Matthew Burns, from Margate, Queensland, was working one night when his boss called to tell him he had a problem with his PC. "He said his PC was making a grinding sound. I automatically thought it was a fan. He said it was the one over his CPU, at which point I started to worry. He then told me he'd done a bit of investigating himself and had removed the fan to find a cockroach in it." While talking, Matthew's boss then noticed the heat sink's grills were full of dust, so to it clean he pulled out the sink. "He then confirmed my worst fears that the CPU was still attached to the heat sink, and worse, he then accidentally dropped it to the floor. He said it should still be right as he straightened the pins. Before I could do anything, he told me he'd removed the bent pin he couldn't straighten. I told him of the good scenario vs expensive scenario. In the good one we would get a second-hand CPU, in the expensive one he would get a new PC. And $1,000 later we got a new PC." APC

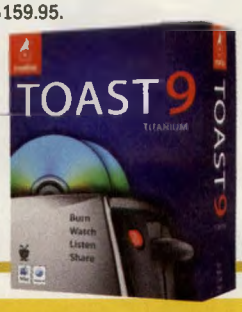
BURN THE EVIDENCE

Robert Clapham is the managing director of a security company in Moonah, Tasmania, which supplies digital surveillance equipment. He says, "It is not uncommon for us to get a request from a customer to assist with 'bu rning evidence' to CD or DVD for passing on to police."

When one customer was asked by the police to collect evidence and to supply it to the authorities on disc, he asked his accounts department to do it. Clapham says the customer received a query from accounts asking: "What they were doing 'burning evidence!?'" Even after quite a lengthy description as to what we meant by 'burning' (writing a CD), we are still not convinced he was any the wiser.

WINNERS!

The launch of Roxio Toast 9 Titanium redefines Mac burning. Toast 9 allows consumers to record high-def content from high-def camcorders and Blu-ray discs, as well as their favourite HD programming from Elgato's EyeTV devices. Users also have the option to burn HD video and slide shows on standard DVDs. For on-the-go entertainment, Toast 9 introduces Roxio Streamer, which allows users to stream video content stored on their Mac to a Wi-Fi connected iPhone or iPod Touch or any internet connected Mac or PC. Toast 9 also offers the ability to capture streaming audio for recording internet radio, and allows captured music tracks to be automatically tagged with song titles, artist or other related information. RRP $179.95 inc GST. Also up for grabs are two copies of Roxio Easy Media Creator 10, Roxio's Vista-ready flagship suite of digital media applications worth $159.95.



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Send in your tales of woe involving dumb end users or incompetent techies to ***apcenduser@acpmagazines.com.au*** and if we print it, you'll win a prize. You must supply contact details in order for us to verify your contribution.

EndUser

from The readers of *APC*

APC readers who deal with new computer users or incompetent IT administrators share their survival stories.

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Failing to register

Offshore tech support is again the culprit in one reader's tale of registration woes. Watchdog investigates.

I recently purchased a UPS made from Powerware, the 700VA. Although the hardware is fantastic, I had some extreme problems with the software, so I decided to contact the Powerware support via email (the actual company is Eaton). I've been into computers for 20 years now, so I believe I am considered an experienced user. Not only did I follow Powerware's directions to register my software online, but I even received an email from them thanking me for registering the software! I paid money for this product and, when I install it, I demand it to show up as registered. It is very annoying to take five seconds every time you run the software just to ask you to register it!

MY CONTACT WITH THE EATON SERVICE SO FAR HAS BEEN TREATING ME LIKE A CHILD THAT HAS NEVER HAD A PC BEFORE

My contact with the Eaton service so far has been treating me like a child that has never had a PC before. I asked them politely to respond to my emails and find a solution. They still treated me like a newbie. Then, I demanded a proper support answer from someone who could actually talk to me technically, and I even threatened them that I would go public with the story. Their response was... no response! They stopped answering my emails altogether! Clearly whoever deals with the emails has no idea about their product, and no idea about how to respond to a customer! I would appreciate it if you could contact them and find a solution to my problem, which I am sure other purchasers have as well.

Kosta Karagiann
Roselands, NSW

Watchdog approached Eaton about Kosta's problems and asked the company to look into the less-than-supportive support.

Lost in translation? US tech support is not exactly who you want to be talking to...

Dear Watchdog,

In response to your email, I haven't yet seen the initial email correspondence between the customer and our US support people. The initial problem was that the customer registered his product on our US web site instead of our Australian web site, so his queries went to the US and were subsequently handled by our US support team. I'm looking into procedures to make sure that these requests get forwarded to us in future. Once we received the customer complaint via *APC Magazine*, we got our local software support team in touch directly with the customer.

The main problem was with the customer's firewall. The registration process uses a secure channel to collect customer's data so that they can enter the information in safely. The customer's firewall deemed the registration process as a threat and blocked the registration window as a pop-up. The solution was to set the firewall to enable access to our Powerware web site, which is secure. There was one final issue with a greyed-out button for management settings — I understand that this is a PC configuration issue, and our guys have given the customer some tips as to how to resolve it. The last email from the customer stated "It looks like my problems are coming to an end. Many thanks and I will keep you posted how it goes."

Michael Mallia
Marketing Manager,
Electrical Group
Eaton Industries

Kosta had mixed feelings about his experience but was happy to have arrived at a solution: "I was contacted on my mobile two weeks ago by the Eaton support team here in Australia. They were quite helpful and suggested things that weren't suggested in previous emails. One of their staff was very helpful and contacted the US Eaton department on my behalf; hence, this time i got some answers and not arrogant, one-word replies. My only point to them was that they claimed that their web site is secure, so me 'lowering' my firewall was not a big issue. By the way, my firewall (ZoneAlarm) never told me that it was blocking their site or such a connection. It did it silently.

"So, disabling my firewall, was my thinking and effort. Anyway, I explained to them that disabling my firewall not only exposes my PC to various internet trojans, spyware and viruses, although their web site is secure, but if my PC was infected, it would start spreading those viruses (etc.) without me knowing and without being able to stop it from happening. Hence, they should find some other way of registering the software. Nevertheless everything went fine, and in a week's time I was able to solve the registration problem.

"Regarding the 'greyed-out' buttons on the main app, it seems that after the registration process the machine needs to be rebooted for them to become active. That was mentioned nowhere, not even the web site. A pop-up saying that the machine needs to be rebooted in order for the program to become fully functional would be nice. I want to thank you very much for going to the trouble of contacting them for me, but it seems that at least the US support is no support at all; maybe they should revise some of their employees there. To your magazine and your team, congratulations and many thanks again!"

ALL WORK AND NO PLAY: WHOSE IDENTITY IS IT ANYWAY?

Tony Benci of Geelong South, Victoria, wrote in to *APC* Watchdog at his wit's end, incensed at EA's lack of accountability after losing his character identity in online game Battlefield 2. As Tony told us: "I am an injured party in EA's inability to control its BF2 franchise. I have tried without any success to get EA to fix this. I'm sure that it is working on the ostrich stream of problem solving – if they don't acknowledge it, the problem will go away.

"Game playing is now a serious business. Most new games have an online element and we play them striving to increase our character asset. This problem with BF2 is serious and the game developers have to acknowledge it and be made to understand how they are obliged to protect our investment."

As Tony explained, gamers will spend about $80 to purchase EA's Battlefield 2, but the real investment comes in the amount of time spent on developing your character and ranking: "The stats are the currency of BF2. How much is 1,300 hours worth? It is priceless; that is what it's worth. The problem is you can't protect them."

One night while playing, Tony unwittingly accessed the game via a hacked server, only later to find that his soldier record was corrupted beyond use and his stats reset. When he tried to get this fixed, Tony claims he was treated as a cheat for having used a 'dodgy' server and was told that his character medals would not be restored, as EA wanted to "stem the outbreak of server hacking". Tony told *APC*: "When push comes to shove, I just want my soldier back; what possible reason could EA have for not repairing a problem it has created and allowed to continue? Anyone know a good class-action e-commerce lawyer? Googling has shown that many thousands, perhaps tens of thousands have suffered this fate.

"If EA has no way of protecting us from this hacking then it has an obligation to warn us all, plain and simple. Further to this, if we are hacked by entering a server that EA has charged a licence fee for and have published on the rank servers list from within BF2, EA has an inherent obligation to a) protect us and b) make good our loss."

Watchdog approached EA with Tony's complaint, but, despite being given multiple opportunities to respond, the company failed to provide *APC* with a response in time for publication. So, what do you think?

In light of the amount of time online gamers invest in their in-game character(s), should game companies be obliged to back up and/or hand over the character stats in situations like these? Whose identity is it anyway? Email your thoughts to epinions@acpmagazines.com.au.

EBAY'S BLACK MARKET

I was recently the successful bidder for a 'BRAND NEW HP ProLiant ML150 Tower Server' on eBay. Upon receiving the winning confirmation email (through eBay), I contacted the seller, SaveOnIT, to get an accurate price for freight charges before I paid for the item.

The reply email from the seller asked me to call them. I promptly called the seller, who informed me the server in fact does not exist and he had actually sold it several months ago. I am not a big eBay user; however, I thought this was very odd and I was disappointed to say the least. My understanding is that an item is listed for x number of days or weeks until the listed cut-off time, when the item is sold to the highest bidder.

The seller explained that he and his business partner buy end-of-life or ex-demo HP units and resell them with small margins, and the servers that don't sell quickly get listed on eBay.

The following day he sent through a list of servers that he *could* supply. Imagine my shock when I discovered that he could sell me a server half as good for twice the price?

Brian Townley
Coffs Harbour, NSW

We passed on Brian's story to eBay, who offered the following response:

Dear Watchdog,

eBay cannot comment directly on your reader's experience due to privacy concerns. However, it is important that all eBay members finalise their transactions on the site when purchasing.

eBay encourages all buyers to send in reports of sellers who attempt to take the transaction outside of eBay's systems or do not fulfil their obligations once an item has been sold. On receiving such a report, eBay will investigate and take the appropriate action against sellers who do not comply with site policies (action may include a suspension of their account).

To finalise a transaction on eBay, ensure that you are the winning bidder and also use eBay's checkout system. Doing so allows eBay to view the method of payment that was used.

eBay strongly discourages buying and selling outside of eBay for the following reasons:

- Doing so puts members at a high risk of having a problem.
- Members can't give or receive feedback on these items.
- eBay can't fulfill requests for contact information of these outside buyers and sellers.
- Members will not be able to use eBay's dispute process.

Melanie Vine
PR Manager
eBay Australia

Brian thanked APC *for looking into the matter but was ambivalent about the end result: "I received a similar response from eBay. I find it hard to believe that they use privacy as an excuse to not enforce sales. Interestingly, the same eBayer is selling away similar server systems (I assume only if he is happy with the end price). I find it comical that the seller also wrote 'BEWARE — Sellers can't leave negative feedback, I would if I could.' Never again!"*

Now you see it, now you don't? Be careful you don't buy a phantom product on eBay...

watchdog@acpmagazines.com.au

Has an IT vendor or telco stuffed you around? Let us know about it and we'll chase them for a solution on your behalf. Letters sent to watchdog@acpmagazines.com.au must include the writer's full name, street address, suburb, state and phone number to be considered for print publication (please also include details such as invoice numbers and people you've spoken to). Address and phone details will not be published. All correspondence becomes the property of *APC* and is subject to editing.

Vista vs XP

First, it was Windows vs Mac, then Windows vs Linux. Now, it's Windows XP vs Windows Vista.

The gloves are off: OS against OS in *APC* readers' war of words...

Your Windows correspondent (James Bannan in Windows View, August *APC*, page 18) seems a little upset and even taken aback by the failure of the IT community to welcome Vista with open arms. As an IT professional who also runs a small business network of four XP machines for his wife's business, I'd like to explain some of the reasons for this lack of love.

First, it is not clear what business advantages Vista brings over XP Pro. It is almost impossible to produce a business case for an upgrade on the grounds of new functionality or ease of use which makes any financial sense. Most of our machines have 500MB RAM and run business-critical apps such as Quickbooks, Australia Post EParcels despatch, the ATO and banking POS software.

It is not clear if these would work under Vista or require upgrades, and even if they would, it could take hours to hunt down new drivers and do the install and test — not to mention any retraining for users and the cost of upgrading machines and/or RAM.

For example, I have heard many stories at trade shows of printers and barcode devices which have stopped printing altogether under Vista or function only in black and white, and whilst not Microsoft's fault, this is a powerful financial disincentive to upgrade. It is also not clear how well or easy it is to have XP and Vista machines working together on the same network, since most businesses will continue to have a mixture of operating systems for the foreseeable future.

When I leased our latest Dell machine I made sure it had XP Pro on it and was able to simply use an image of our old PC to bring everything across as easily as possible. This is the reason XP lingers on in business and we are seeing so many XP downgrade disks available.

Until Microsoft produces an operating system with Vista that offers real business financial benefits and works with everything, then users such as myself will hold off until forced to upgrade. Interestingly, it is just about possible to make a business case for buying Apple machines going forward and running XP in a virtual machine and this is probably the way our business will go as there are real benefits in the increased security and lack of admin time required to set up and run such a network.

James Hough
South Yarra, Vic

WINDOWS 7 WISHLIST

I thought it would be only fair if I comment on some of the comments (about what should be in Windows 7, August *APC*, page 6) sent in.

"Make it run fast, so put the bloatware on a diet. The Windows Presentation Foundation layer etc. is excessive."

You will actually find the WPF overhead is minimal and in some cases it will run faster. Think about it: you are using Direct3D to render your windows (which is hardware-based) instead of GDI which is some horrible old API from back in the Windows 95 days. You can even

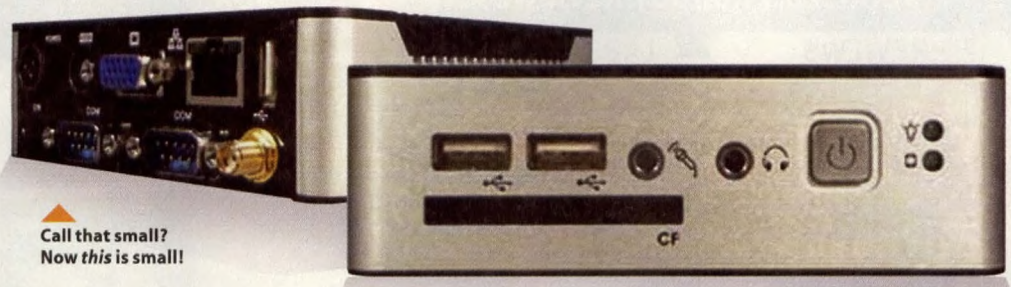
letter of the month

POWER OVERKILL

I'm looking for a PSU for the PC I've just built. You can't find any below 350-400W at any computer store, and if you go to any PC enthusiasts forum you'll be told that that's too small, buy one that's at least 500-600W. A power meter shows that, even working hard, the PC – built with an energy-efficient AMD 780G chipset motherboard and BE-2350 CPU – only uses about 75W. There's nothing I need it to do that it won't do, using any more than half its CPU power. The PC industry is getting tiresomely like the car industry where if it's not bigger it's not better, and if it doesn't weigh two tonnes and/or have a V8 there must be something deficient about your manhood. It's time a lot of people in the industry, including the specialist media doing the reporting and reviewing, realised there's a lot of people who want to do their bit to save the planet too, and they can, and do just as much, and save money while they are.

Gordon Drennan
Burton, ACT

Gordon wins this issue's Letter of the Month prize, a Logitech Cordless Wave Desktop keyboard and mouse set valued at $179.95.



Call that small?
Now *this* is small!

turn off Aero if you want to run in old-style Windows XP graphics mode anyway. So this is really a non-issue. If you have hardware that can't run Aero properly why do you have Vista installed on it?

"Drop the excessive DRM. When display monitors etc. are locked down things are getting extreme to say the least."

DRM in Vista doesn't actually limit you in anyway. If you are not playing HD content that is DRM protected it does nothing — it is disabled. It will only kick in when you play protected HD content which you can't play on any other OS yet anyway.

"Test, test, test. Microsoft Windows and apps tend to be buggy."

This is a very common misconception. I tend to find Microsoft does some of the best quality control in the business. Problem is that the end user will always blame Microsoft when something crashes. A perfect example is the blue screen of death.

Most people blame Microsoft when the blue screen itself is generally caused by someone else's device driver or someone else's hardware failing. Another problem is people who don't understand how software work think Microsoft is bad because they release patches all the time. You can't write 100% bug-free software no matter how much you try.

"Grow up and learn to live in a world which also has Apple Macs and Linux. Microsoft will not have the internet to itself. Businesses are now demanding open standards, and regulators will stop Microsoft in their tracks if they try it. . ."

They have started to do this a little. With Silverlight they have made a few moves in the right direction with trying to go true cross platform and not just Windows cross-platform. I tend to always get the feeling that when Microsoft makes design choices it doesn't even take into account other platforms exist because it is so dominant.

"Run on old computers smoothly and efficiently — talking about something like PII 400, 64MB RAM, 4GB HDD, 32MB graphics intergrated graphics (because believe me these kinds of computers are harder to get rid of from the community than you may think)."

This one confuses me. Why would you want to install Vista on a computer with such low specs? It would make more sense to install a version of Windows on it that was around when it was purchased. Just because a new version of Windows comes out doesn't mean you need to rush out and put it on all your computer hardware.

There are two reasons this is a bad idea. 1) Microsoft won't make money off old hardware, it gets most of its sales doing OEM installs on new computers. 2) It makes more sense for Microsoft to optimise Windows for current hardware. I would be extremely pissed off if Windows didn't make full use of my Q6600 with 4GB of RAM and 1TB HDD with 512MB 8800GTS just so someone who doesn't want to spend money can install the latest version of Windows. So if you have old hardware install an old version of Windows on it.

Wil Taylor
Armadale, Victoria

EVEN TINIER PC

On the cover of your recent issue you featured the "World's smallest PC".

Not even close! I use embedded Windows-based devices in my work, and am currently using a way smaller box than that!

Have a look at **http://tinyurl.com/32j93b** — I get them from the Australian agent in Brisbane called Synrax. These will happily run XP on their 512MB of memory. They fit completely within my hand. Each has an IDE connector inside, and a real hero could squeeze a 2.5in HDD in there, or a 1.8in with ease. Even has a mini-PCI slot inside as well, which they use for a wireless-G card, with the antenna sticking out the back if you order that option. $200-and-something dollars each for the version I use (the middle-of-the-range one). Fanless, too.

I am eagerly awaiting the second generation of Intel Atom announcements. I go to Computex in Taiwan when I can, and there were some preview Atom boxes shown there in June, but a second-generation embedded Atom should be able to do some cool stuff!

Phillip Dimond
South Turramurra, NSW

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This month in Labs. . .

Win/win with greener ways

Last month, *APC* was heavily involved in a competition run by Western Digital and Gigabyte to give away a Toyota Prius. Now, this wasn't some kind of mail-in affair, and nobody had to save three thousand soft drink bottle caps — it was a competition of skill and knowledge between a large number of system integrators and resellers.

What we asked them to do was to build, using certain technologies (being GreenPower WD hard disk drives and Gigabyte Dynamic Energy Saving compatible motherboards), systems that would save power and still offer a good amount of performance to the end user. Now, this competition really brought a number of aspects of the 'Green IT' movement to the forefront I hadn't considered in depth before.

First and foremost, a business going green isn't just something to make itself more attractive to its customers; it makes good business sense, in real dollar terms. Buying 'green' power-optimised PCs saves big on power bills. Turning off lights does the same. Recycling in bulk can earn some cash back from previously landfill-bound packing materials; the list goes on.

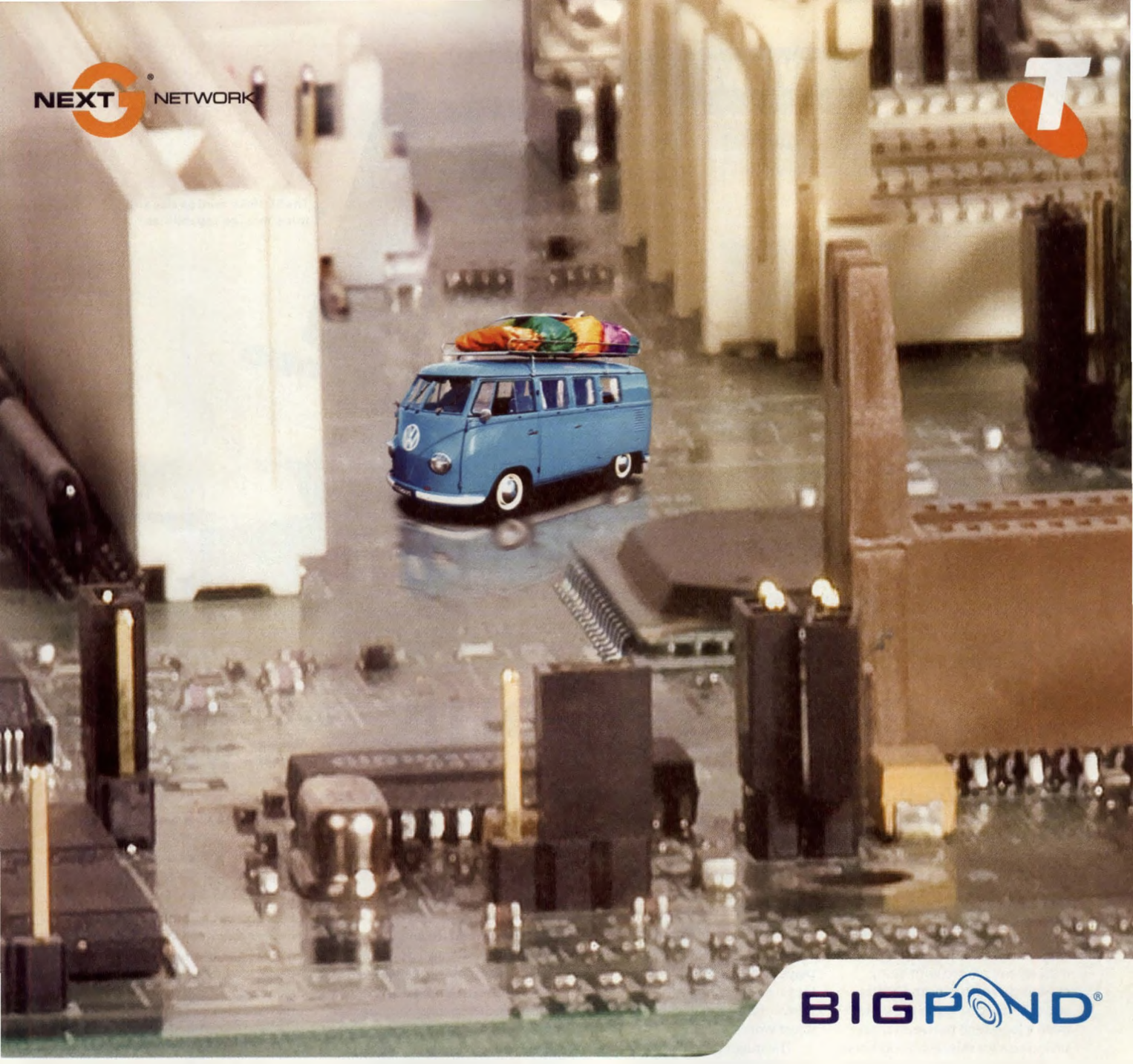
It's not just for the big guys either. At home you can end up with a decent amount of money in your pocket just by being a bit greener with your tech. Personally, I bought and implemented a Windows Home Server, primarily to act as a central storage hub in my network and provide backup to my sometimes precariously configured PCs. Even though I got the functionality, I also ended up saving a decent amount on my power bill each quarter, as I no longer need to keep my super-power hungry desktop PC on 24/7. Considering how little I spent on my home server, a real low-spec affair, costing me about $200, plus some spare parts I had lying around (and the secondary 'storage' hard disks from my main desktop PC), the server is going to pay for itself in two years *and* I have functionality I didn't before I installed it.

What it comes down to is that being greener about your business and home computing doesn't have to be a drain on resources, both environmentally and financially. If you take a step back and have a think about what you really need, and where you're being wasteful — does it take an overclocked quad-core with two graphics cards to download torrents overnight? — it's going to pay us back in a few ways. Cleaner air and some more cash in your pocket. How is this not a win/win situation? APC

> IT'S NOT JUST FOR THE BIG GUYS EITHER: AT HOME YOU SAVE MONEY JUST BY BEING A BIT GREENER WITH YOUR TECH

Geek

NICK RACE – TECHNICAL EDITOR



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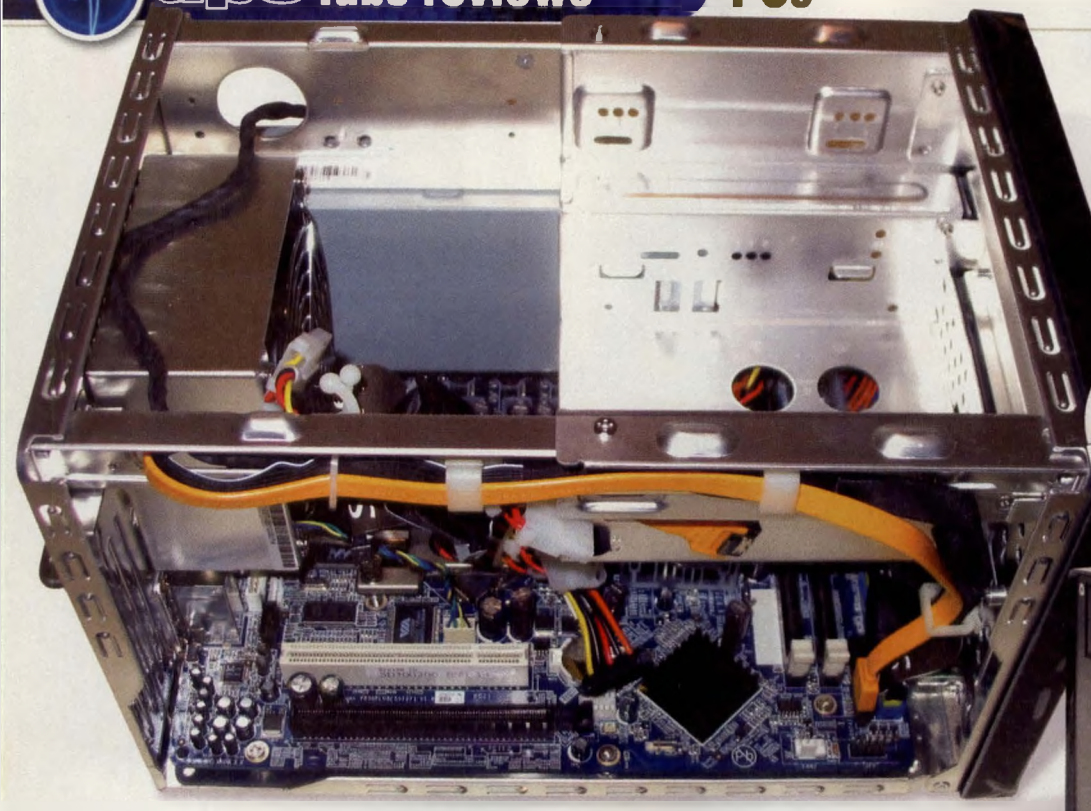

The SD30G2: mini on size and price, maxi on capabilities.

Shuttle SD30G2 PLUS

The original shoebox PC is back, with a matching miniscule price.

CONTACT	Shuttle
ONLINE	www.shuttle.com.au
MARKET	Everyone
PRICE	$269

✔ Cheap as chips; quiet, yet cool enough.

✖ Poor integrated graphics; no Wi-Fi?

8/10

At the risk of sounding out of touch, I have to be honest and let you know that it's been five long years since I last grazed my knuckles on the interior of a Small Form Factor (SFF) PC. I remember when the first Shuttles hit the market, and played with many models thereafter (both Shuttle and the shoebox wannabes) but it's been a long time between space-saving sips for this reviewing horse.

So when I was asked if I'd like to check out Shuttle's newest creation, I was keen to see how its designs had evolved. Perhaps it had tapped into the Tardis's dimension-warping powers, allowing a Tri-SLI system with water cooling and thousand-watter PSU to fit inside a case the size of a Rubik's cube? Or maybe I'd uncover a miniature cold-fusion reactor in place of the typically underpowered (by an overclocker's standards) PSU? Turns out I was wrong on both counts: when I first slid the lid back it was as if I'd stepped back to the year 2003. At first glance, this barebones PC could have been the very same one I built a mate's HTPC for back when DVD was still only found in enthusiast PCs. But the more I played with this new case, the more I realised that Shuttle didn't need to reinvent the wheel with this design. It just works.

The major difference from the Shuttles I'd played with in the past is the cooling solution. The CPU is kept comfy via three heatpipes, which pass the sweat on to a small fan at the rear. While I'd seen heatpipes in a Shuttle before, the mounting mechanism wasn't as easy to fit, nor snug, as the one in place here. It's a very quiet solution, making this the perfect basis for a HTPC. However, if you want to thrash your CPU with higher voltages, it's not going to cut the mustard. Overclockers beware. However, I did like the CMOS clear button on the rear of the case, so if you decide to dabble with the relatively limited options and end up with a door stop, it's easy to reset everything to default levels.

Obviously it's also got a new chipset. Using the Intel 945GC + ICH7 combo, it supports the latest 45nm 1,333MHz chips, but the rest of the specs aren't too impressive. DDR2 speeds top out at 667MHz, while the Intel GMA 950 integrated graphics chipset dates back to 2005, a primitive time when integrated graphics weren't expected to deal with the weight of Blu-ray decoding. As a result you'll need a fairly hefty CPU (2.6GHz minimum) if you want to ensure smooth HD movie playback.

Other than that, things remain unchanged. There's a single PCI slot for an add-in soundcard, as well as a PCI Express slot for a better video card. The latter slot is fairly close to the side of the case though, so make sure your video card's cooling solution is relatively thin: you've got about 22mm to play with. The onboard Realtek ALC888 audio chipset is fine for movie viewing, but it appears that optical S/PDIF outputs are optional: in the review unit there were holes on the rear of the case for in/out, but no physical connections. The manual also lists it as having Digital S/PDIF In/Out, so double check that these are included if you decide to purchase it.

There's one final difference I noticed with this Shuttle: I can now afford one. It's certainly not because I've got more spare cash either; Sydney's back-breaking rent has taken care of that. I can thank Shuttle for dropping the price. At around $260, building a SFF PC has never been cheaper. Let your fingers do the walking and you could fill this up with all the necessary bits for another $500 or so, giving you a comprehensive HTPC for half the cost of a standalone high-end Blu-ray player.

It might not be the most feature-packed SFF barebone PC around, but there's no denying that the SB30G2 PLUS ticks all the right boxes.

Bennett Ring

Toshiba Portege R500

Extreme portability, but does it measure up in other areas?

- CONTACT Toshiba
- ONLINE www.toshiba.com.au
- MARKET Everyone
- PRICE $3,630

✔ Extremely lightweight; built-in broadband.

✖ Flimsy build quality; lousy performance.

5/10

Ultraportables are the latest hot-ticket item in the world of laptops, and while the ASUS Eee PC and the Apple MacBook Air are two of the most popular notebooks in that niche, the R500 trumps them both in sheer mobility.

Weighing a feather-light 887g, the R500 shaves a few grams off the Eee PC's carry weight while still accommodating a 12.1in display and full-sized keyboard. Plus, it has a minimalist silver motif not unlike the MacBook Air's design (albeit without the seamless lines) and manages to throw in built-in mobile broadband, a healthy selection of ports and slots, and a DVD drive.

It's a potent combination enough to make any road warrior weak at the knees, but a couple of serious shortcomings make the R500 considerably less attractive. For starters, it feels too flimsy.

Specs-wise, the R500 seems ably-equipped, with a 1.3GHz Intel Core 2 Duo U7700 ultra-low voltage processor, 1GB of memory, Intel GMS 945GMS Express graphics and a 120GB 5,400rpm hard drive. But day-to-day performance tells another story. Put simply, the R500 isn't gutsy enough to run Windows Vista Business, and using it for even simple tasks like web browsing is punctuated with long delays. Even our test DVD was unwatchable, with severe audio lag and jitter.

As expected, the benchmark results aren't flattering. In PCMark05, it scored 1,980 PCMarks, which is low even by ultraportable standards, and on par with the performance you'd expect in a sub-$1,000 notebook. 3DMark06 resulted in a similarly underwhelming score of 139. The R500's RAM can be upgraded to 2GB but the better alternative is taking up the offer to downgrade the notebook to Windows XP Pro.

Another sore point is the 12.1in screen. It's a good size and has a decent 1,280 x 800 resolution, but view it even slightly off-center and the contrast washes out completely so you can't see what's on screen.

But the R500 does have some redeeming qualities. Battery life from the standard 6-cell battery is a decent three hours and 29 minutes with our rigorous DVD run-down test — real-world usage should be closer to five hours without wireless switched on. The inclusion of built-in HSDPA is another perk that saves you from having to use an external card or USB modem, although you're tied into using BigPond, which has the widest coverage but the most expensive data plans.

Touch-typers will appreciate the R500's full-sized and comfortable keyboard — a feat that Toshiba achieved by extending it all the way out to either side of the casing. Another area Toshiba hasn't skimped is connectivity. All of the wireless bases are covered with 802.11a/g/n Wi-Fi and Bluetooth 2.0 + EDR, and for connecting peripherals it includes three USB 2.0 ports, FireWire, VGA, Gigabit Ethernet, SD memory card slot and a Type II PC Card slot. A biometric fingerprint sensor is located between the mouse buttons, but — surprisingly — there's no webcam above the screen for video conferencing.

At $3,630 for this particular configuration, the R500 is in the same price league as the flagship MacBook Air and Lenovo ThinkPad X300. However, even with the mobile-friendly conveniences and long battery life, the R500's flimsy build and pokey performance make it feel like a much cheaper laptop.

Jenneth Orantia

Light as, but how does it compare to its peers?

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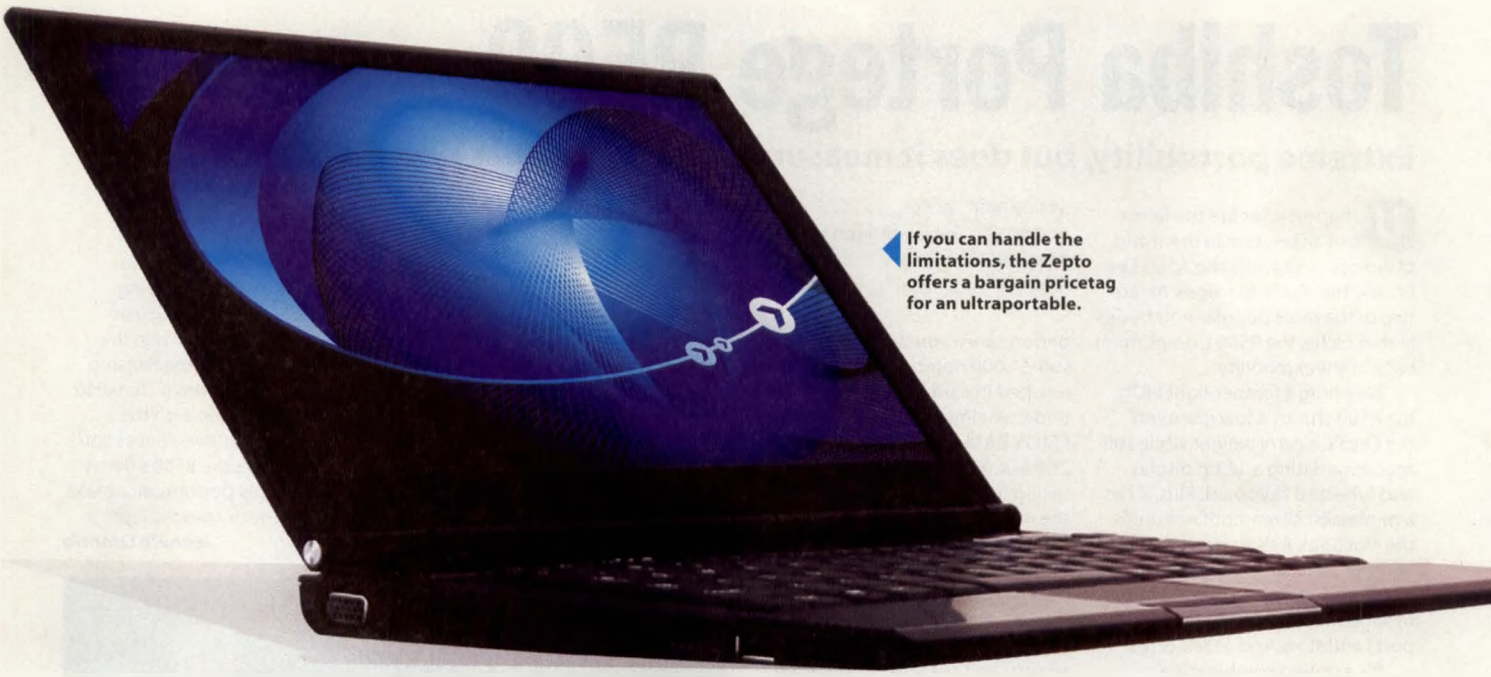

If you can handle the limitations, the Zepto offers a bargain pricetag for an ultraportable.

Zepto Notus A12

Want all-day battery life without paying through the nose?

CONTACT	Zepto
ONLINE	www.au.zepto.com
MARKET	Everyone
PRICE	$2,158

✔ Battery life.

✖ Perrformance; keyboard spacing.

6/10

Zepto isn't a brand name we're familiar with, but the European company has an intriguing product in the Notus A12 notebook. It's the first full-sized laptop we've seen that runs Intel's A110 processor — previously only found on UMPCs like the HTC Shift and Fujitsu LifeBook U110 — and its main claim to fame is an all-day battery life of up to nine hours.

This feat is achieved using a combination of a low-voltage A110 CPU, an ultra-low power consumption of 4.1 watts (most notebooks use between 8-12 watts), an LED back-lit display and a slower-running 4,200rpm hard drive. To get the nine-hour battery life, you'd have to dim the screen all the way down and employ some aggressive power-saving techniques; as it was, we achieved four hours and 44 minutes on our DVD run-down test, which amounts to roughly six hours of regular usage, an excellent result for an ultraportable, especially at the Notus' bargain basement pricetag.

The Notus A12's design is minimalist, so much so that it doesn't have any branding on the lid or anywhere else on the casing. It's still attractive in an understated way, though, with a black magnesium alloy casing that doesn't attract fingerprints the way a glossy finish does. The wedge-shaped construction actually bears a strong resemblance to the Portege R500, and while the sturdy metal casing makes it heavier at 1.37kg, we feel the trade-off is worth it for the extra durability.

From a system perspective, the Notus is essentially a UMPC dressed in notebook clothing. It runs the Intel A110 processor clocked at 800MHz, with a 400MHz FSB and 512KB of L2 cache, and comes with 1GB of DDR2 667 RAM soldered to the motherboard (non-upgradeable). The 80GB hard drive is also small for a machine this size but typical for a UMPC.

Performance for everyday tasks is extremely average; as soon as you've got two or more tabs open in Internet Explorer, it starts to lag quite noticeably, and moving between windows or even just clicking on a link takes a couple of seconds before the system catches up. The Notus A12 is by no means a snappy machine, and if you're in the habit of having several windows and applications open at a time, this isn't a good machine to do it on. In PCMark05, the Notus scored a record low of 562 — worse than the HP Mini-Note 2133's score of 661. 3DMark06 results were slightly better at 893, which is just enough to run Vista's Aero interface.

The upside of being housed in a notebook case instead of a UMPC is that it's got all the standard notebook amenities, namely a 12.1in display, comfortable keyboard and room to fit a decent amount of USB ports and other connectors. It doesn't have a built-in DVD drive, but you can order an optional Samsung burner for a little extra.

The Notus' keyboard is close to full-sized, but we had a few issues with its layout. Zepto has chosen to put the keyboard right in the middle of the notebook's lower half, and while it looks nice and symmetrical, it means there's a lot of wasted space above the keyboard that could've been used to make the touchpad and mouse buttons larger. As it is, the latter two are impractically small and squashed up against the keyboard, and the small wrist-rest area means part of your palms have to dangle uncomfortably over the lip of the notebook. Also, the unit we received didn't have a localised keyboard, so some of the symbols — including the often-used @ — have been relocated to other keys.

With any unfamiliar brand, warranty and service becomes a concern. The Notus A12 comes with a two-year return-to-base warranty as standard, and you can option this up to a two-year pick-up-and-return or three-year warranty when you're configuring the notebook. Zepto uses United Electrical for servicing, and according to the local rep, it has 300 service centres in Australia and 30-35 in New Zealand.

Jenneth Orantia

Lenovo IdeaPad U110

A pretty workhorse? No, just pretty.

Best known for its conservative ThinkPad range of laptops, Lenovo has come up with an entirely different concept for the IdeaPad U1110. Rather than the blocky edges and matte black finishes that are readily associated with the ThinkPad — and many other laptops, in fact — the IdeaPad looks like it's tumbled off the pages of a fashion magazine, with its fire-red aluminium lid, glossy black interior and a super-sleek profile.

The floral pattern etched onto the cover — referred to by Lenovo as its 'tendril texture' — marks the IdeaPad U110 as an unmistakeably feminine laptop. The style comes across as more old-fashioned than contemporary, but the same can't be said for the interior, which is coated entirely in a high-gloss black finish. Even the keyboard is glossy, and while it looks stunning straight out of the box, it gets greasy very quickly. Lenovo supplies a polishing cloth with the laptop, but it's a hassle to keep wiping it down when it starts to look grimy — which is basically after every time you use the keyboard or mousepad.

Whether you like the design or not, there's no denying the U110's sex appeal. It makes most other laptops look positively beast-like, with a thickness that's just a hair over two centimetres (the MacBook Air measures 19.4 mm at its thickest point) and a weight of only 1.09kg with the standard four-cell battery — noticeably lighter than the MacBook Air's 1.36kg weight.

While we're comparing it to Apple's ultraportable, the U110's footprint is also more compact than the MacBook Air thanks to the 11.1in display (although it looks larger as it's flush with the rest of the lid). This runs a higher-than-average resolution of 1,366 x 768, so you're not sacrificing anything in the way of viewing area. But the U110's shiny veneer works against it here, as the on-screen glare from ambient light is a big distraction while you're using it.

Like every thin-and-light before it, the IdeaPad U110 puts portability before performance. However, it's still got a decent set of specs for its size, including a 1.6GHz Core 2 Duo L7500 chip (with 800MHz FSB and 4MB cache), 2GB of RAM (upgradeable to 3GB), Intel X3100 integrated graphics chip and a 120GB 4,200rpm hard drive. We would've liked to see an option for integrated WWAN like on the ThinkPad X300, but we'll settle for the 802.11a/g/n Wi-Fi and ExpressCard slot for adding an external wireless broadband card.

If your computing needs only extend to web surfing, word processing and the occasional movie, the IdeaPad is better equipped than most other ultraportables, achieving an above-average score of 3,069 PCMarks in PCMark05 (the MacBook Air scored 2509). Graphics performance is a more modest 595 in 3DMark06; however, it runs Vista's Aero interface smoothly.

The U110's slim profile makes the lack of internal DVD drive forgivable, and Lenovo includes an external one in the box for no extra charge. This uses up two of the three available USB 2.0 ports; other inputs include a 10/100Mb Ethernet port (not Gigabit, surprisingly), FireWire, 5-in-1 memory card reader and VGA. The standard biometric fingerprint reader has been omitted in favour of Lenovo's VeriFace face recognition software, which uses the 1.3-megapixel camera above the screen to log you into Windows. Unlike every other face recognition program we've tried, this one actually works, using your eyes as the calibration points for recognition.

Also in the box is an extra 7-cell extended battery — a good thing, as the standard 4-cell battery has limited stamina. Using our punishing DVD run-down test with the standard battery (with an external DVD drive attached and all the power saving and wireless features turned off), it only ran for 40 minutes before shutting down — a result that can be extended to roughly an hour and a half's worth of regular usage.

Jenneth Orantia

- CONTACT Lenovo
- ONLINE www.lenovo.com.au
- MARKET Everyone
- PRICE $2,999

✔ Size; weight; extra battery.

✖ Attracts dirt.

7/10

Flame on: there's no denying the U110's sex appeal.

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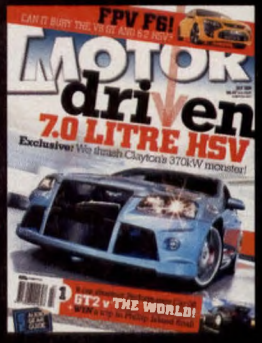

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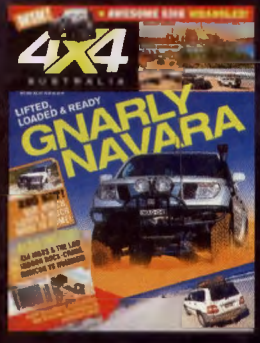

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XFX GTX 260 XXX Edition

If a $800+ price tag worries you, the lower-clocked GTX 260 may well suit.

CONTACT	XFX
ONLINE	www.xfxforce.com
MARKET	Everyone
PRICE	$549

✔ Performance; bundle; price.

✖ Power hungry at load.

9/10

While the GTX 260 carries with it the same major features of the GTX 280 (ie. CUDA and PhysX), it is stripped down in certain areas to lower the price.

Stream processors are down from 240 to 192, Texture Addresses/Filters are also down from an 80/80 configuration to 64/64, and ROPs are down from 32 to 28. The memory bus has also taken a slight hit from 512-bit on the GTX 280 to 448-bit on the GTX 260. Moving away from a 256-bit/512-bit memory bus also means that you can't have 512MB/1,024MB memory configurations. For this reason, the GTX 260 carries a very unusual 896MB of GDDR3 memory.

As you would expect, raw MHz is also down. The GTX 280 Core/Shader/Memory comes in at 600MHz/1,296MHz/2,200MHz DDR, while the GTX 260 comes in at 576MHz/1,242MHz/1,998MHz DDR. With the particular card we have here, being an XXX version it does come overclocked out of the box. This brings us an increase to 640MHz/1,242MHz/2,300MHz DDR, making it faster than the standard GTX 280 in both core and memory.

Physically, the GTX 260 and GTX 280 are almost identical in size and appearance; both are dual-slot and have a black shroud covering the entire card from top to bottom. Outside of stickers, the only way to tell the difference is the lack of an 8-pin power connector on the GTX 260. Instead of an 8-pin/6-pin configuration, the GTX 260 carries with it a simple dual 6-pin setup.

Outside of the actual card being included in the box, we have a DVI to VGA connector, Component-out dongle, audio loop back cable, molex to PCI Express power connector, driver CD, the usual line up of paperwork along with a full version copy of Assassin's Creed.

However, what makes the XXX cards so special is of course the massive out-of-the-box overclock.

What ultimately matters when everything is said and done is performance! The GTX 260 certainly doesn't disappoint in this area. At resolutions of up to 1,920 x 1,200, for the most part it sits very close to an overclocked GTX 280 whilst being able to beat out a stock clocked one. At 1,920 x 1,200 under World in Conflict we see the GTX 280 with a 52fps average and the GTX 260 with a 51fps average. Similar things are seen in Unreal Tournament 3 with 119fps and 105fps between the two cards. The only time we really see the GTX 280 truly pull ahead is at 2,560 x 1,600 where it's able to get a 96fps average in Unreal Tournament 3 while the GTX 260 pulls in a much lower average of 68fps. With that said, the GTX 280 does pull ahead of the GTX 260 at 1,920 x 1,200 under some games, so it isn't a total write off for people with 24in monitors or smaller.

Really, when looking at the performance the GTX 260 is the card to get — especially if you're on a monitor that does 1,920 x 1,200 or below. The big price jump to the GTX 280 isn't really justified for these kinds of users. What the GTX 260 does is bring us big performance and all those excellent GT 200 features at a much more reasonable price. The performance we get out of the GTX 260 and its price point not only makes this product extremely attractive, it also makes the GTX 280 simply way overpriced. XFX has done a good job with the GTX 260 and if you're looking for something extremely fast out of the box it will be worth keeping an eye out for the XXX variant of the card.

Shane Baxtor

Flashy and affordable means XFX has set the new must-have benchmark.

AMD's latest is inexpensive (and powerful to boot).

Sapphire HD 4870 GDDR5

AMD's long-awaited HD 4870 has finally hit the shelf.

CONTACT	Sapphire
ONLINE	www.sapphiretech.com
MARKET	Everyone
PRICE	$449

✔ Cheap; performance; CrossFire.

✖ Small bundle.

8/10

The HD 4870 has been one of the most anticipated releases of the year, next to the GT 200 series from Nvidia. It's finally time to see what AMD has been doing for the past eight months, and whether or not it was enough to be a serious competitor in the graphics card market once again.

The main focus for AMD is to offer the absolute best bang for buck; it has done this with the HD 4850, which outperforms cards like the 9800 GTX, which is around 50% higher in price. The HD 4870 is the big brother to the HD 4850 yet manages to carry with it an extremely aggressive price tag of only $449. It can be found even cheaper if you look around.

While the new HD 4870 might not carry features like CUDA and PhysX, the card really is a bit of a technological masterpiece. Where the GTX 280 and GTX 260 carry 240 and 192 Stream Processors, the HD 4870 carries a whopping 800. Also included are 40 texture units and 16 render back ends.

What is quite interesting is the inclusion of GDDR5 for the first time on a graphics card. AMD has opted to use a 256-bit memory bus which is half of the GTX 280, but the inclusion of GDDR5 has boosted overall memory performance. Compared to the HD 4850, which has an impressive 2Gbit/s transfer rate, the HD 4870 and its 512MB of GDDR5 offers a peak of 3.6Gbit/s.

Out of the box, the HD 4870 comes with a dual slot cooler, much like the one we saw on the HD 3870. The CrossFire connector sits across the top as do the two 6-pin PCI-E sockets. There's the standard line-up of manuals and a driver CD, a full copy of 3DMark06, two molex-to-PCI Express connectors, S-Video to RCA convertor and a component-out dongle.

At the moment there hasn't been a company to have done anything with clock rates. Our core comes in at a stock 750MHz while the GDDR5 comes in clocked at 1,800MHz DDR. While the clock on the memory might seem relatively low, massive amounts of bandwidth mean that you don't need these extremely high speeds. As yields increase and production costs become lower, there's no doubt we'll begin to see GDDR5 memory get well and truly past that 2,000MHz barrier.

Placing the card in our X48-DQ6 testbed and firing it up had us listening to the fan spinning at full speed; it's horrendously loud. Fortunately, this is all sorted out upon the installation of a driver. At load and idle we're getting about 60dBs out of the card, which is pretty standard. On a system with a single hard drive, ROM drive, overclocked Q6600 and 2GB of memory, a single card is pulling at load 278W. If you feel like adding a second card into the mix, your system can peak as much as 480W with just these few items connected. It's worth remembering the importance of a good-quality power supply; for a single card we would recommend a quality 520W+ unit, while for two you're probably looking at the 650W+ area.

Performance figures find the card sitting between the GTX 260 and GTX 280 in most applications; it never beats the GTX 280 though, but you have to remember that it's half the price. For the same price as a single GTX 280 you can have two HD 4870s, and as long as you have a board that supports CrossFire, you're going to see the GTX 280 beaten most of the time for the same price.

While the HD 4870 isn't the fastest single-cored graphics card on the market, its CrossFire price and performance is simply amazing. The price of a single card is extremely impressive and means that more people can get into high-definition gaming cheaper than ever before. It seems that the HD 4870 has been worth the wait, and if you're looking at getting superb value for money, then it's really impossible to pass up.

Shane Baxtor

ASUS M3N-H/HDMI

With Nvidia's GeForce 8300 mGPU, can this HTPC motherboard beat AMD's best?

CONTACT	ASUS
ONLINE	www.asus.com.au
MARKET	Everyone
PRICE	$149

✔ Bells and whistles; Blu-ray performance.

✖ Speed; expensive; no gaming.

7/10

The promise of an HTPC in every couch potato's lounge room dates back to ancient times, when Harry Potter didn't have stubble, high definition was a grade at school and 5.1 speakers were seen as a luxury. So why is it that we're yet to see a HTPC in the home of a person who doesn't have the albino tan of a technology lover? Regardless of the fact that HTPCs are still a long way from hitting the mainstream, the industry is forging ahead with silicon designed to offer the best HTPC experience. The ASUS M3N-H/HDMI motherboard is one such component, based around NVIDIA's new GeForce 8300. The GeForce 8300 is Nvidia's answer to the popular AMD 780G chipset, the current HTPC chipset of choice thanks to its excellent integrated graphics performance.

Nvidia refers to the GeForce 8300 chipset as an mGPU, short for motherboard GPU. It contains all of the logic to look after the regular motherboard duties, as well as a discrete graphics solution based on the standalone GeForce 8400 architecture. Let's take a look at the more interesting stuff first — its ability to pummel polygons and pixels alike.

While it might not be up to speed for the latest DX10 games (all three of them), movie lovers will lap up the chip's support for Nvidia's PureVideo HD acceleration. This offloads most of the load from the CPU to the mGPU, allowing stutter-free Blu-ray viewing. When we put the M3N-H to the test with Edward Scissorhands, CPU utilisation hovered around the 20% mark, only a few per cent higher than AMD's 780G chipset. This is outputted via a HDMI 1.3a output, which can also carry 8-channel LPCM bitstream audio (unfortunately TrueHD and DTS-HD are not supported... yet).

Gaming performance isn't quite as impressive as video decoding, though. Even when running at an eye-straining resolution of 800 x 600, today's games don't so much crawl as they collapse in a wheezing, sweaty heap. It must be said that the 780G chipset suffers from the same lacklustre gaming performance. However, if you do choose to install another Nvidia graphics card for the occasional bout of big-screen PC gaming, it's nice to know that the mGPU will contribute to the load thanks to Nvidia's Hybrid SLI. Just remember that the standalone card must be around the same speed as the discreet solution.

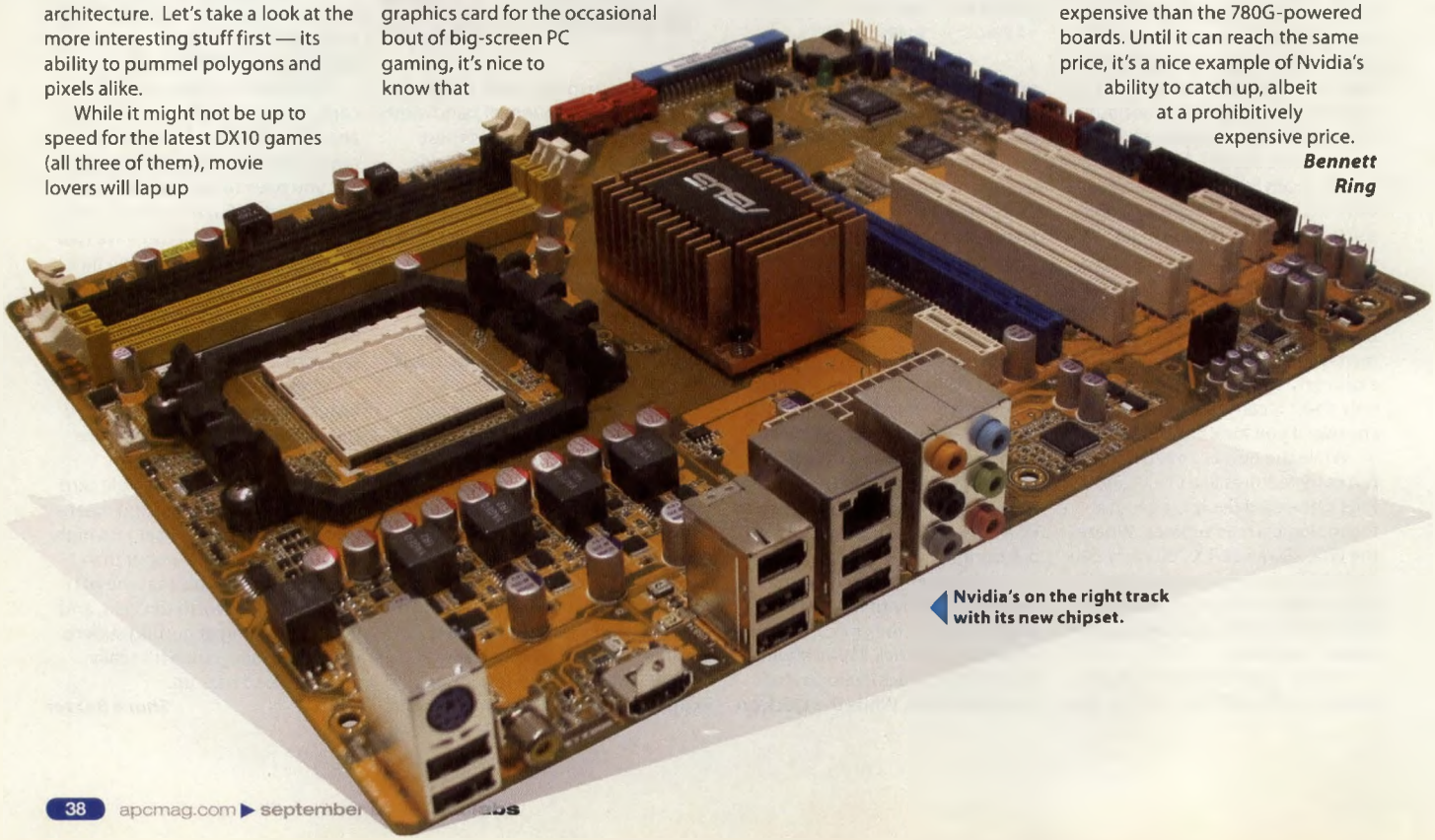
As far as the usual mundane motherboard duties, the GeForce 8300 chipset offers PCI Express 2.0, Gigabit Ethernet, HyperTransport 3.0, DDR2 10066/800/667, 6 x SATA 3 ports and a whopping 12 USB 2.0 ports. Not bad considering all of this, as well as the Blu-ray friendly graphics processor, is packed into a single chip with passive, silent cooling.

We were a little surprised to see ASUS favour a full-sized ATX layout with this board, as most HTPC owners prefer the smaller Micro-ATX form factor. Still, by doing so, there's plenty of room to move, though we would have liked the RAM slots to be a few millimetres further away from the CPU socket to accommodate a larger, quieter heatsink. As usual with ASUS boards, we appreciated the multitude of features that actually come in useful, rather than being mere bullet points on the box. The Q-connector makes hooking up front panel ports a much simpler job, while the Linux-based Express Gate allows basic web surfing and Skyping without a lengthy boot into Windows.

While the BIOS offers basic tweaking options, it appears that squeezing so much functionality into one chip has resulted in a lowly overclocker. We managed a paltry 5% increase over the standard frontside bus, regardless of how lovingly we tweaked the limited voltage options.

When comparing the feature set and performance, the ASUS M3N-H/HDMI measures up nicely against 780G-equipped boards, proving that Nvidia is on the right track with its new chipset. Unfortunately, a quick price check on staticice.com.au shows that, at around $150, the M3N-H/HDMI is 50% more expensive than the 780G-powered boards. Until it can reach the same price, it's a nice example of Nvidia's ability to catch up, albeit at a prohibitively expensive price.

Bennett Ring



Nvidia's on the right track with its new chipset.

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TPG

LaCie 2big network 2-bay NAS

LaCie's 2big network ticks the right boxes for performance, looks and ease of use.

LaCie's has long been a favourite provider of external hard drive units, particularly for Mac users. As well as delivering functional products, LaCie has been focused on making aesthetically pleasing hardware. The 2big network is designed by Scottish-born, Paris-based industrial designer Neil Poulton. The aluminium case of the 2big network is about as wide as two hard-cover novels with a single, large blue light on the front case.

Equipped with a pair of 500GB drives, the 2big network can run as either a RAID 0 or RAID 1 array (in LaCie's terminology, "big" and "safe" modes respectively).

It's worth noting that LaCie's claim of 1TB of storage is based on using the 2big network in "big", mode which means there's no protection for data. If you're using "big" mode and one of the disks is lost, all your data will be lost. In "safe" mode, if one of the disks fails it can be hot-swapped. A 2TB version is also available.

The 2big network's Gigabit Ethernet interface provided for zippy performance. We copied large files to and from the 2big and found its performance very good.

There are two USB ports on the back of the 2big network for connecting other drives giving it some scope for expandability.

One of the issues many NAS devices face is keeping the disks cool. The life of a drive can be significantly impacted if it constantly runs hot. The 2big network overcomes this by using the aluminium body, with its finned top and sides, as a large heat sink. As well as being a clever design feature, it also means that the 2big network can reduce the number of fans it needs to operate. This helps make the 2big one of the quietest NAS units we've tested.

If you're looking for an easy to use NAS that'll provide hardware redundancy, good performance and is easy to use then the 2big network from LaCie ticks most of the right boxes. However, if you're looking at it as a potential component in a multimedia LAN where it'll act as an iTunes server or similar then the 2big network may not be the best option for you. That said, this is one of the few NAS devices that actually quiet enough to work on a desk and it looks great to boot.

Anthony Caruana

CONTACT	LaCie
ONLINE	www.lacie.com/au
MARKET	Everyone
PRICE	$599

✔ Easy to use; looks good; performs well.

✖ No iTunes server.

7/10

Thecus N3200 Home NAS

Made with the home user in mind.

While most NAS units wouldn't look out of place in a factory, the Thecus NAS 3200 has a sleek look that's more tailored for the small office or home. It looks more like a regular household appliance than a piece of network wizardry.

The N3200 we reviewed was furnished with a full complement of three hard drives (Hitachi 1TB DeskStar 7K1000) giving a total of 2TB of space in a RAID 5 configuration. That means that the loss of a single drive won't result in any data loss. Should a drive need replacing it can be hot-swapped without any interruption.

After powering the N3200 on for the first time we connected to the configuration utility via a web browser. From there, it became apparent that the N3200 offers incredible flexibility. After enabling the Media Server and iTunes Server options, we could instantly see the N3200 as a source for multimedia content. Our Windows and Mac test systems could all see the N3200's default fileshares without any effort other than changing the N3200's Windows Workgroup membership.

Using the gigabit LAN connection we found that that the N3200 was able to deliver content quickly with no problems.

While sitting idle, the N3200 was quiet enough to sit on the desk near a work area. However, while operating we found that the increased fan speed and sound of the hard disks operating was too loud.

One of the great things about the N3200 was its ability to carry out scheduled downloads. Given the poor state of Australian broadband, the ability to schedule downloads to occur during off-peak periods is extremely valuable and can save you many late nights.

Rounding out the N3200's abilities is its capacity to be used as a security system. Simply connect a compatible USB web-cam and it can shoot and record video. The USB port can also be used to connect a USB Wi-Fi dongle making it wirelessly accessible.

Given the increased need for us to store data as our media collections expand, we can see the Thecus N3200 finding a place in many homes. Its ability to securely store and deliver data coupled with its ease of use makes it a candidate for home and small office LANs.

Anthony Caruana

CONTACT	Thecus
ONLINE	www.thecus.com
MARKET	Everyone
PRICE	$1,770

✔ Ease-of-use; good performance and looks.

✖ Noisy.

8/10

Lexmark X4875

Moderately priced all-in-one inkjet.

A moderately priced inkjet all-in-one, the Lexmark X4875 can be directly connected to a computer via USB, shared across a network via its Wi-Fi interface, or used as a stand-alone printer with various types of storage media.

The installer walks you through the physical setup while the software loads in the background. By the time you've removed all the securing tapes, flipped out the trays, fitted the ink cartridges and so on, the software is nearly ready to go. The wireless setup routine was painless, but does require a temporary USB connection.

Drivers and software are provided for Windows 2000, XP (including x64) and Vista, plus Mac OS X 10.3 to 10.5 (including Intel). The Windows software includes a utility for scanning, printing and managing images (including OCR and conversion to PDF), and the Lexmark Toolbar to assist in printing web pages from Internet Explorer. The Mac bundle comprises printing and scanning software plus ABBYY FineReader OCR. Documentation comprises a user's guide booklet, a more extensive manual in PDF form, and Windows and Mac help files.

The LCD panel is on the small side at 6cm, but is bright and clear, and Lexmark has made good use of the space available without over-cluttering the interface.

Nominal print speed is 4 ppm for colour documents and 10 ppm for monochrome. We recorded 38 seconds click-to-drop for the first A4 colour page, with the second emerging after another 37 seconds.

Print quality was typical for the X4875's class. Text appears sharp enough to the naked eye, though some fuzziness is visible under magnification, and business graphics were reasonably bright and smooth. Photo printing on plain paper using the three-colour cartridge was acceptable. Click-to-drop time for a 6 x 4in colour print was two minutes and 9 seconds.

Media cards (SD, MMC, xD, Memory Stick and CF) and PictBridge cameras are supported for direct printing. Scan quality was better than some more expensive models we've tested.

The printer's internal memory allows the production of multi-page collated copies, though this feature is limited to around 20 sides of A4 mono text. Text copies were impressive for a sub-$200 device.

Unlike our experience with the Lexmark X6570, the X4875 never failed to reconnect with the Wi-Fi network when waking from low power (sleep) mode, so it looks like the company has got that issue well under control.

Stephen Withers

CONTACT	Lexmark
ONLINE	www.lexmark.com.au
MARKET	SMB
PRICE	$199

✔ Well-featured Wi-Fi MFD.

✖ Photo printing lacks sparkle.

6/10

Canon Selphy ES2

Portable photo printing.

The Canon Selphy ES2 photo printer is primarily intended for standalone use but can also be directly connected to a computer via USB. The case is a 'handbag' design with a hinged and spring-loaded carrying handle on the top. The white and beige shell has a robust feel, but we would have liked to see a padded bag to protect the high-gloss surface from scratching while on the move.

The ES2 is a dye-sublimation printer, and the cartridge contains the film that carries the dye, along with 50 or 100 sheets of photo paper. The nature of the dye-sublimation process means manufacturers can pack just the right amount of film that's needed for a set number of prints.

Photos can be directly printed from memory cards including variations on Compact Flash, Memory Stick and Secure Digital/MultiMediaCard (including SDHC), and xD. USB storage is not supported, but printing via USB from PictBridge cameras and via iRDA from mobile phones is. Bluetooth connectivity is an optional extra.

Drivers and software are included for Windows 2000, XP and Vista, and Mac OS X 10.3 and 10.4. The software bundle is minimal, comprising ZoomBrowser EX for Windows or ImageBrowser for Mac, EOS Utility and Ulead Photo Express LE for Windows.

Printing time was a respectable 81 seconds click to drop for 6 x 4in photos. Overall, the printing results were acceptable.

You don't need a computer to modify photos before printing as the Selphy has built-in smarts. The front panel screen and buttons can be used to crop images, adjust colours, correct red-eye, include annotations such as the date, or superimpose graphic elements.

All up, a convenient and flexible unit for those that want to print on the go.

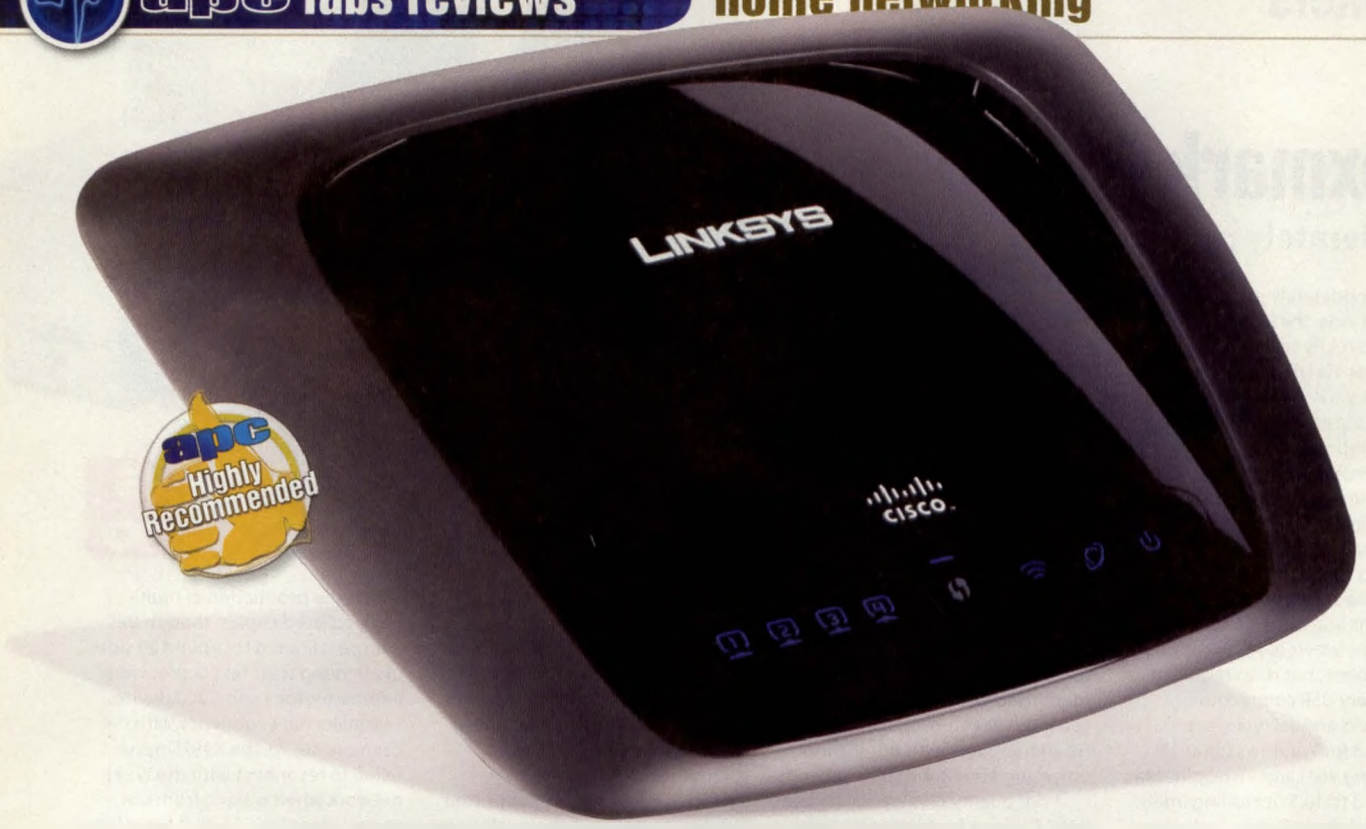
Stephen Withers

CONTACT	Canon
ONLINE	www.canon.com.au
MARKET	Everyone
PRICE	$299

✔ Completely portable; flexible.

✖ No protective bag.

7/10



Linksys WRT310N Wireless-N

The Linksys WRT310N Wireless-N broadband router builds on the WRT160N.

When we reviewed the Linksys WRT160N earlier this year we found that there was a lot to like but that the lack of Gigabit capability was a serious deficiency. Well, the folks at Linksys have responded with the WRT310N. As well as replacing the all-black casing with some faux aluminium trim, they've added Gigabit wired networking to the package.

Setting up the WRT310N was very easy. There's a sticker across the ports on the router instructing us to run the setup utility from the CD before plugging anything in. While experienced users might ignore the advice, we suggest that it's followed as the installation process provided excellent advice and made setting up a secure, working configuration very easy. All our settings were saved in a text file so that, in the case of a serious disaster, we could recover all of the settings without having to delve into the depths of our memory bank.

The last step in the start-up process is installation of LELA — the Linksys EasyLink Adviser. This software is one of the best innovations we've seen in home and small office networking in some time. Once LELA is up and running it gives a snapshot of the entire network. Each device can be managed from LELA and, if there's an unauthorised computer connected, you can block it right there and then; there's no need to set up MAC address exclusion or anything complex — just click and block.

The web browser-based configuration utility was well arranged with most options clearly labelled. In addition to the usual array of internet connection and DHCP options, there are QoS and port-forwarding options. VPN passthrough is supported and can be blocked. Security features cover the expected firewall, which is enabled by default, and the ability to block wireless access to the router's configuration utility.

CONTACT	Linksys
ONLINE	www.linksys.com.au
MARKET	Everyone
PRICE	$239.95

✔ Easy setup; performance; range.

✖ No dual-band Wi-Fi.

8/10

Performance over the wired connection was very snappy. We were able to copy large files, in excess of 350MB, across the LAN in just a few seconds. Full screen video was playable off the wired connection and we could pick any lost frames.

Wireless range was sensational — the WRT310N is certainly one of the best routers we've tested in this regard. Using our standard test rig of a Toshiba Portege R500 and Apple MacBook Pro we were able to maintain a full-strength connection at 25 metres. Even putting a solid brick wall between us and the router only took the connection back to fair. We maintained a network ping back to the router while testing and didn't lose a single packet while testing.

What don't we like? Well, the WRT310N lacks dual-band wireless. That's not a big deal but it does limit the flexibility of the router compared to other units on the market. Also, although Linksys has released a Mac version of its LELA setup software, it's yet to ship the full network management functionality. We downloaded and tested the Mac software as it was only released the day we started writing this review. The software worked well although it depended on the router being set to the factory defaults. The installer failed if we changed the router's default IP address. This isn't likely to affect new users but if you've fiddled with the settings and want to use the setup utility to change something it won't work.

If you're in the market for a new router then the Linksys WRT310N Wireless-N Broadband Router should be on your shortlist. Other than lacking a 5GHz radio, it ticks all the boxes for a home or small office wireless router and delivers excellent wireless range. For those operating in a multi-platform environment, configuration via web browser works well and Windows users get the full power of LELA.

Anthony Caruana

Three Internet Key

Easy to set up and great performance.

It wasn't so long ago that mobile access to the internet involved some sort of black magic and animal sacrifice. Thankfully, times have changed and it's become almost trivially easy to get up and running with mobile internet. Three's Internet Key makes it even simpler with a sleek device that doesn't require a driver CD — all the required software is included on the device.

The Key is a re-badged Huawei E169G. Unlike its predecessor, E220, the E169G doesn't require a USB cable to connect to your computer or dangle off to the side. The Internet Key looks like a run-of-the-mill USB memory stick with a SIM card securely pushed into a camouflaged slot near the connector.

Installation of the Internet Key begins when you insert the device into a USB port on your PC or Mac. On both platforms, a window appears with a link to the software, which is stored within flash memory in the device. Given the move to sub-notebooks that sometimes lack optical drives, this makes setup pain-free.

We tested the Key from a fixed location in the Melbourne CBD and while on a train. Connections, as long as we were in Three's coverage area, were established in a few seconds and we didn't experience any drop outs. Connections speed, measured using the broadband speedtest (**www.speedtest.net**) were rated at about the 1,000Kb/s mark. While that's not express, we found it more than adequate for email, web browsing and some downloads. Upload speeds ranged from the high 200s to low 300s. Again, this was reasonable in our view and superior to what some users see with low-end ADSL plans.

It's worth remembering Three is augmenting its network to deliver up to 7.2Mb/s. The Interent Key will support those higher speeds.

Three's network coverage is very good within and around the major Australian capital cities. However, if you venture to more rural areas, the connection roams onto Telstra's GPRS network. When this happens, the LED on the Internet Key glows green instead of the usual blue, providing a visual cue. This is important, as roaming to Telstra incurs extra charges. However, the connection software for both Macs and Windows allow you to limit connections so that roaming to Telstra's network is disabled. We'd recommend this

Three's Internet Key gives its service a great boost. Performance testing suggests that the Internet Key has superior signal reception to the Express Card unit and the all-in-one design is far more elegant than the USB modems common with many mobile ISPs. For mobile users in urban areas, Three's service is definitely worth a look, although the roaming charges, for those planning to use Key outside the city may make it a less-attractive option.

Anthony Caruana

CONTACT	Three
ONLINE	www.three.com.au
MARKET	Everyone
PRICE	$249

✔ Easy setup; small; pricing.

✖ Network coverage; roaming charges.

7/10

SMC Mini Wireless Barricade G Router

This pocket-sized router delivers simplicity and flexibility at an affordable price.

They say that good things come in small packages — SMC's Mini Wireless Barricade G Router-SMCWBR11-G definitely supports that theory. While not the most feature rich-unit we've seen, it beats almost every other router we've ever seen in one department — size. The Mini Wireless Barricade G is about the size of a cigarette box with a short antenna poking out the back.

Powering the up the Mini Wireless Barricade G for the first time revealed another first — it can be powered directly from the USB port of a computer. If you're in a small office where powerpoints are at a premium you can use the supplied lead to deliver juice to the Mini Router.

There are two Ethernet ports on the Mini Wireless Barricade G — one for the incoming internet connection and another for a computer.

As you'd expect from a 10/100 and 802.11b/g router, performance was unspectacular, but that's not what this router is about. Wireless range was about 15 metres before the first bar of signal disappeared on our Toshiba Portege R500 and MacBook Pro test systems. Another eight metres saw signal drop to just one bar. However, in a small office or hotel room it would pass the 'good enough' test.

Another useful application of the Mini Wireless Barricade G is that it can be configured as a wireless bridge, by using its WDS support, making it handy as a cheap way to extend your wireless LAN. Furthermore, it can support two WLANs running simultaneously, each with its own security settings. That's a feature we've only seen on the far more expensive Belkin N1 Vision.

We were intrigued when working through all the Mini Wireless Barricade G's settings to see that it had support for QoS. However, the support is quite rudimentary with the ability to limit either all upload or download traffic through the router. It's not possible to manage traffic for specific TCP ports or IP addresses. Still, if you need to run an open hotpsot, in a restaurant or cafe for example, you could intentionally throttle traffic to keep the leeches at bay.

Despite its small size, the Mini Wireless Barricade G handled everything we threw at it. If you're looking for a feature-rich network beast the Mini Wireless Barricade G isn't for you, but if you're looking for a portable LAN solution that doesn't cost the earth and just works then SMC's Mini Wireless Barricade G might just fit the bill.

Anthony Caruana

CONTACT	SMC
ONLINE	www.smc-asia.com
MARKET	Everyone
PRICE	$119

✔ Small; easy to set up; dual SSID support.

✖ No 802.11n.

7/10

TiVo HD

With more hype than an Apple launch, Channel 7 is set to unleash TiVo.

If we were reviewing the TiVo when it was launched 10 years ago in the US, we might agree with Seven's PR hype that "It's the biggest revolution since the invention of television", but eight years after the launch of digital television the TiVo is hardly cutting-edge technology, let alone revolutionary.

Unlike its US counterpart, the Aussie TiVo is a crippled box. Shipping with (what we understand to be) a 160GB HD, the TiVo allows you to record up to a pathetic 32 hours of HD or 62 of SD television. If you like a show, forget about copying it to DVD or your hard disk; there is no DVD burner and the Ethernet port is strictly for downloading the EPG from TiVo. No problem, you might think, simply open the box (having acquired a set of security screwdrivers) and pop the hard disk into your computer. Don't bother, as Channel Seven representatives assured us the TiVo is designed to respect Australian copyright laws and all data on the hard disk is encrypted (hence the acknowledgement of Turing encryption in the credits).

So why would you shell out nearly $700 on a TiVo?

To be fair, the TiVo is probably one of the easiest PVRs to use. Although it initially failed to properly negotiate the HDMI display resolution, once we manually selected a compatible format we were up and running. We hope that this was due to receiving a pre-release unit but if not, there will be a few people wondering why their TiVo isn't working.

CONTACT	TiVo
ONLINE	www.mytivo.com.au
MARKET	Everyone
PRICE	$699

✔ Very easy to use; no subscription fees.

✖ Locked down; pathetic 160GB hard drive.

3/10

Assuming you have an internet connection in your lounge room (or a home wireless network and have purchased the optional wireless network dongle), setup is a no-brainer. After agreeing to the licence and entering our postcode, the TiVo connected to our internet and downloaded channel information, tuned the channels and loaded initial EPG.

A lot of effort has gone into making the TiVo interface as idiot-proof as possible. Remember, it has been designed for the ultimate couch potato! The remote control is colour-coded so you only need to press one button to do most things.

The whole aim of the TiVo is that it will hopefully try to determine what type of shows you like (by monitoring what you record and give the "thumbs up" to) and offer recommendations. In the US where TiVos work with free to air, cable and satellite and you have hundreds of channels to choose from, this could be a useful function. Here in Oz where the TiVo only works with the five free-to-air channels, what's the point?

At the launch, Channel Seven were at pains to point out that the TiVo gives you more content. We cannot understand where this content comes from given that an Aussie TiVo cannot download movies from the net, play videos from YouTube or even stream from your computer network.

The answer given was that it will help you find what you like from the free-to-air offerings. Hello? With only a maximum of 10 free-to-air channels, it's not that hard to find things from a TV guide, particularly if you know how to use Google, or hook up another PVR with the existing IceTV guide.

Another claimed benefit is that the TiVo can automatically program shows using the EPG. This would be great if the TV stations ran to schedule and shows actually aired when they were meant to. In our tests we missed the first and last parts of programs because the TiVo guide does not account for the fact that our television stations cannot start and end programs on time! Although the TiVo does allow for some scheduling slip, in our tests it was not always enough, particularly when the guide says Greek News is showing but they're still speaking Russian because SBS is running late!

Thankfully, you can manually set record times (usually five minutes before and 15 minutes after tends to work), but what is the point of TiVo if you have to program the timeslots in yourself anyway?

When the TiVo officially launches we understand you will be able to remotely program it to record via the web but this functionality was not enabled in our review unit. Let's hope the web interface lets you start recordings earlier and finish them later otherwise you will still need to find the program from other sources.

If you presently use your Foxtel IQ to record free to air, you can get the same functionality with the TiVo for a one-off payment and not have to pay for Foxtel subscription. Of course, you can also buy a digital PVR with a larger hard disk and DVD burning.

Hype aside, the TiVo is basically a locked-down PVR which requires an internet connection to work properly. If you are technical enough to have internet in the lounge room you probably already have a PVR, and if you are not that savvy you probably don't have that level of internet connectivity available anyway.

The TiVo hopefully learns the type of shows that you like, makes recommendations and allows you to find programs with your favourite actors, genres or subjects.

Perhaps when the free-to-air stations embrace multi-channelling and there is a large variety of programming to chose from, the TiVo will offer a really easy way to find what you want to watch. But for now, if it's not showing on the limited free-to-air offerings, the TiVo just tells you there's nothing on, and you don't need a $699 box to work that out!

David Neiger

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OXX Classic 600 Internet Radio

Internet radio made easy — no PC required!

The OXX Digital Classic 600 Internet Radio takes the hard work out of enjoying internet radio and frees you from only being able listen in front of your PC. Essentially the Classic 600 is a Reciva Internet radio packaged in a stylish box that looks and operates more like a radio than a piece of technology.

The front panel is dominated by a single 4in (supposedly) full-range speaker grille and two knobs, one to control volume and the other to select stations. Next to the speaker is a four-line LCD display and five favourite preset buttons, a power switch and three buttons to control the menus. The back of the unit has an FM antenna, socket for a wired internet connection, stereo headphone socket and auxiliary input jack. Classic 600 radios are available in a range of colours including a stylish piano black, silver, gold and funky shades of blue and red.

Setting up the Classic 600 is a simple matter of plugging the unit into the power and connecting a network cable or setting up the wireless networking. The unit supports most current wireless protocols and will connect to a secured wireless network using either WEP or WPA. Since there is no keyboard, you need to cycle through a menu of letters and symbols to enter the wireless network key. This is tedious, but only needs to be done once.

Once connected, the Classic 600 'phones home' to the Reciva portal to access lists of stations. The portal allows you to browse for stations by country and genre making it a simple task to find music you enjoy.

The Reciva portal is claimed to be regularly updated by the user community and has one of the most current lists of internet radio stations on the web.

Sound quality is very much dependent upon the bit rate of the internet broadcasts and network traffic. On our business grade internet connection using a wired connection, stations broadcasting at 128Kbit/s often sounded better than FM radio. Overall sound quality is as good but no better than a PC with a reasonable sound card.

David Neiger

CONTACT	OXX
ONLINE	www.oxxdigital.com
MARKET	Everyone
PRICE	$299.99

✔ Easy to use; good quality sound.

✖ Expensive; mono speaker.

7/10

Panasonic DMR-XW300 HDD/DVD

Easy to use and full of great features — but expensive.

If you cannot pony up over $2,000 for a Blu-ray full high definition recorder, the DMR-XW300 is a good second choice.

Like its Blu-ray recording bigger brother, the DMR-XW300 comes with twin high-definition digital tuners allowing you to record two programs simultaneously to its hard disk. However, you only get a 250GB hard disk (compared with a 500GB hard disk on the Blu-ray recorder) and support for DVD and CD media only.

The unit looks and weighs about as much as a typical DVD recorder, and apart from the label on the front panel that boasts the Twin HD Digital Tuner and 7-Day EPG there is nothing to really differentiate this unit from any other HDD/DVD PVR.

The rear of the DMR-XW300 has the usual array of connectors including HDMI (Version 1.3 with support for Panasonic's proprietary Viera link), component, S-Video and composite, coax and TOS digital audio and analogue stereo. There are also two SCART connectors which we assume provide additional AV inputs (although the tentative sample manual we were supplied does not confirm this) and an Ethernet port.

Designed for non-technical users, the auto setup was very straight forward. The DMR-XW300 automatically found all available digital broadcasts, set the clock from the digital broadcast signals and loaded the EPG.

We can't help feeling that the unit is overpriced, particularly since it is essentially just a DVD recorder, twin HD tuner and HDD drive albeit packaged with fantastic firmware. Provided you live in an area with good digital coverage and you don't mind missing out on Channel 31, this unit is a good stop-gap until the price of Blu-ray recorders comes down to a more affordable price.

David Neiger

CONTACT	Panasonic
ONLINE	www.panasonic.com.au
MARKET	Everyone
PRICE	$1329

✔ Dual HD tuners; 7-day EPG.

✖ Too expensive; no analogue tuner.

7/10

Sennheiser RS130 cordless headphones

At this price, one would expect something really outstanding...

The Sennheiser RS130 cordless headphones come complete out of the box with a stylish (albeit large) transmission dock and AAA NiMh rechargeable batteries. The transmission dock includes the charging cradle, so charging the headphones is a simple matter of putting them on the cradle.

Unlike some of the cheaper cordless headphones, the RS130 transmission dock comes with stereo RCA connectors which should give better stereo separation with less crosstalk than the standard 3.5mm headphone jack.

Adaptors are provided in the box if you do want to plug the unit into either a 6mm or 3.5mm stereo headphone socket.

The headphones are comfy to wear and feature large circumaural pads which totally cover the ears to provide the best quality sound possible. Whilst these headphones do not provide noise cancelling, the pads and design are such that most background noise will not disturb your listening pleasure.

The headphones use FM analogue transmission, which, unlike infra-red, means that you do not have to be in line of sight of the transmission dock. However, being analogue, the signal is prone to interference and noise and this is the unit's main downfall.

With the volume turned down low and a strong input signal you would not generally notice the constant background hiss; however, if you turn up the volume or are listening to particularly quiet parts background hiss is clearly audible.

We tested the headphones using a SACD recording and found that, for wireless headphones, the sound was very well balanced. The headphones have good bass reproduction without being boomy. Mid-range response was excellent and whilst the treble was clear, it sounded flat.

Overall, the headphones are good and whilst no wireless system is perfect, FM is one of the better analogue methods. But, at $349, one would expect the Sennheiser RS130 cordless headphones to have been outstanding, considering that you can pick up a reasonable pair of cordless headphones for less than half the price of these ones.

David Neiger

CONTACT	Sennheiser
ONLINE	www.sennheiser.com.au
MARKET	Everyone
PRICE	$349

✔ Well-balanced sound; comfortable to wear.

✖ Background hiss; expensive.

5/10

Wintal PVR2HD

A good basic dual HD tuner PVR without the bells and whistles.

Compared to some of the more glamorous offerings out there, the Wintal PVR2HD is a basic hard disk drive recorder which isn't much to look at.

The back of the unit has an HDMI connector, component video, composite video and stereo analogue audio. Missing is S-Video and coax digital audio. There are also no Ethernet or USB expansion ports or multichannel analogue audio connectors since the unit only supports stereo sound.

Setup was straightforward and, unlike some other units, it correctly negotiated the HDMI settings with our panel the first time around. The unit has two antenna connectors, which means if you want to use both tuners you need to patch the connectors with a supplied lead.

The setup menu quickly guides you through finding available channels and allows you to start watching television. If you want to refine a setting you need to go to the setup menu where you can specify the video output (widescreen or 4:3), audio settings and your time-zone.

The user interface is clunky and takes some getting used to, particularly since the printed instructions aren't good either. Being a basic PVR, it only works with the EPGs broadcast by the networks and conversely suffers from the same limitations that plague all PVRs being that the networks are notoriously bad at keeping to their broadcast schedules.

The broadcast EPG allows recordings to be scheduled up to seven days in advance and, whilst it works, it is not the easiest thing to navigate through

On the positive side, the unit had no problems simultaneously recording two high-definition programs or recording a program whilst playing back another (but that is what you would expect).

This unit is clearly aimed at the value end of the market and is not expensive for a dual tuner HD PVR. It lacks the bells and whistles of the more sophisticated (and expensive) units such as the ability to copy shows to DVD, support for streaming media and the ability to read memory cards to play music or display photos.

More work is definitely required on the instructions and the onscreen help, but if all you want is a basic PVR without an analogue tuner or smarts and you are prepared to learn how to use it, the Wintal PVR2HD is worth considering. It won't change your life — but it will record television.

David Neiger

CONTACT	Wintal
ONLINE	www.wintal.com.au
MARKET	Everyone
PRICE	$499

✔ Dual HD tuners; large HD.

✖ Digital recording only; no DVD or USB support.

5/10

Leadtek Winfast Palmtop DTV200H

Great software, great remote, very little not to like.

Having reviewed many television capture cards it is a refreshing change to find one that actually works straight out of the box.

The Leadtek DTV200H is a Palmtop USB Hybrid tuner that has a digital and analogue television tuner, audio/visual (S-Video and composite) capture function and FM radio. Physically the tuner is larger than most USB dongles (measuring 11cm x 6.5cm x 2.5cm) but still small enough to carry around with you or sit comfortably on top of your computer.

Included is a decent-sized remote control that is useable even if you have large hands, and is not likely to be lost under a sheet of paper. The remote supports both the supplied PVR2 application and by sticking an overlay on top, Windows Vista MCE.

The best thing about this device is that it worked perfectly as soon as we set it up. Simply enter your country and location and the DTV200H does a quick scan of available digital channels for the region. Using the quick scan mode, it found all of the digital stations within about 10 seconds. Even analogue tuning was very fast especially compared with some other cards which can grind away for 10 minutes or more.

Digital picture quality was excellent; analogue reception however was mediocre, as there was quite noticeable blocking and blurring.

The supplied PVR2 software is very easy to use and is an excellent PVR application in its own right. When in digital broadcast mode, it makes extensive use of the broadcast EPG to provide information about the program currently broadcast and what is coming up next.

Recordings can capture the MPEG stream (the current program) or the direct transport stream (everything being broadcast by that station).

There is the option to record directly by pressing the record button on the remote or using the mouse, set a timer recording or use the EPG.

If you are into the minimalist approach you may find the Palmtop box and remote chunky, and if you only have analogue broadcasts in your area the quality leaves something to be desired. But if you want something that just works and works well, this device is highly recommended.

David Neiger

CONTACT	Leadtek
ONLINE	www.leadtek.com.au
MARKET	Everyone
PRICE	$95

✔ Analogue and digital; easy to use; quality.

✖ Large; mediocre analogue TV reception.

8/10

Samsung i780

Samsung's latest BlackBerry-killer.

Amidst an iPhone-crazy populace that's currently going ga-ga over the mobile's high-resolution touchscreen and brilliant multi-touch interface (amongst other things), there's still a firm contingent of users that insist on a physical keyboard. If you're one of those people, the Samsung i780 is well worth a look.

The i780 is Samsung's first stab at a phone running the Professional version of Windows Mobile, but its design is similar to the company's BlackJack range of smartphones. A square 2.5in touchscreen sits atop a full QWERTY thumbboard, and it's surprisingly compact given all the features that it's packing.

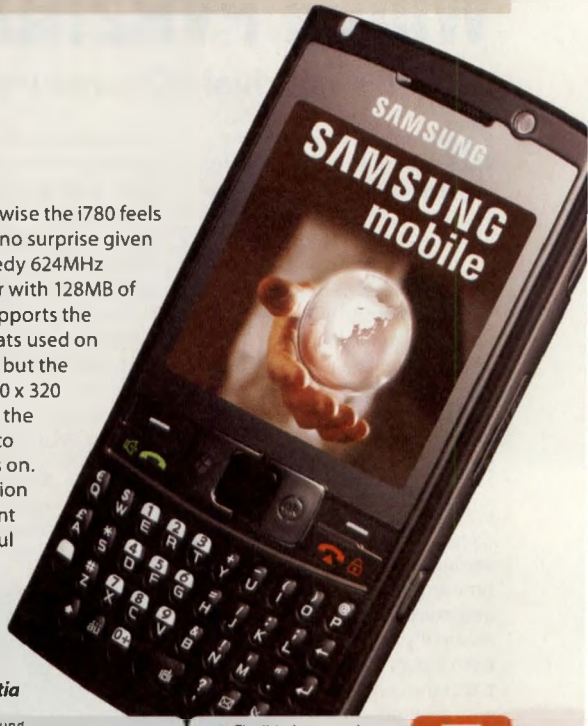
Comparisons to the iPhone are inevitable, but the i780 fares quite well on the features front. It too has 3G/HSDPA, 802.11b/g Wi-Fi and A-GPS, and given that the Windows Mobile operating system has been around for years, there's a huge library of applications and games available for it.

The i780's QWERTY thumbboard makes it a good phone for heavy text entry; the layout is cramped compared to other thumbboards we've used, but the keys are firm and well-defined.

Samsung has added a large serving of its own software to the standard Windows Mobile applications, all of which make the i780 easier and more enjoyable to use. A custom home screen replaces Windows Mobile's Spartan Today screen, with finger-friendly shortcuts to programs, system settings, photo speed dials, call log, text messages and email, while extra media applications let you play more music and video formats, including AAC, H.264 and MPEG-4.

Performance-wise the i780 feels nice and snappy, no surprise given that it runs a speedy 624MHz Marvell processor with 128MB of RAM. The i780 supports the same video formats used on the iPod and PSP, but the square-aspect 320 x 320 resolution makes the screen too small to watch full movies on. All up, a solid option for those that want the more powerful Windows Mobile 6 operating system and a QWERTY thumbboard.

Jenneth Orantia



CONTACT	Samsung
ONLINE	www.samsung.com.au
MARKET	Everyone
PRICE	$849

✔ Flexible input options; lots of extra software.

✖ Mapping software is over-complicated.

7/10

Apple iPhone 3G

At long last, Aussie users can get the iPhone.

The iPhone 3G is about as full-featured as smartphones get, with quad-band GSM and tri-band 3G/HSDPA coverage, 802.11b/g Wi-Fi, assisted GPS, a choice of 8GB and 16GB storage capacities, and a large 3.5in touchscreen. Considering everything it's packing, the iPhone 3G is remarkably sleek and compact, and the tapered rear — available in glossy black or white — makes it easy to grip in your hand.

As most of the functions are accessed using the touchscreen, there aren't many physical buttons on the unit. Mainly, input takes place using your fingers; unlike most smartphones that have touchscreens, the iPhone 3G doesn't use a stylus. Indeed, it won't respond to the pressure of a stylus, as Apple's Multi-Touch technology is designed to only recognise input from your fingers.

This excellent user experience extends to text input also. The iPhone 3G uses a virtual on-screen QWERTY keyboard designed to be used with both thumbs, and while it's no substitute for a physical keyboard, it's really not that far off.

On the software side, the iPhone 3G is light years ahead of anything we've seen from other mobile phone manufacturers. Its operating system is based on the same Mac OS X system used on Apple's desktops and laptops, and it's simply genius. Built-in apps include the fabulous Safari web browser (which renders web pages just as they look on a desktop), YouTube, Google Maps, Weather, Calendar, iTunes (for buying albums over Wi-Fi) and iPod.

A new addition to iPhone 2.0 is the App Store — the same as the iTunes app, only for third party software instead of music. This is yet another paradigm shift, as adding new software to a mobile is usually a convoluted process.

There are, of course, some things that the iPhone isn't so good at or misses out on entirely. The rear-mounted digital camera is an unremarkable two megapixels with no flash, auto-focus, adjustable white balance or video recording. MMS isn't supported, nor is Bluetooth stereo or file transfer, and while support for Microsoft Exchange ActiveSync was added in the latest version of the OS, you can't have both personal and work contacts and calendars on the phone simultaneously. And then there's battery life: medium users can expect to charge every day.

Jenneth Orantia

CONTACT	Apple
ONLINE	www.apple.com.au
MARKET	Everyone
PRICE	$729

✔ Easy to use; built-in apps; third party apps.

✖ Camera; mediocre battery life; no MMS.

9/10

Creative Zen Stone Plus

Creative takes Apple's screenless iPod shuffle head-on.

The latest Zen Stone Plus is actually the third iteration of the product line. The intermediate version added a small OLED display, and the current model adds a built-in speaker and extended battery life (up to 20 hours). As with previous models, it packs in a lot more features than you'd think possible in such a tiny frame, including an FM radio, stop watch and voice recorder.

Sitting at the entry-level end of Creative's MP3 player range, the Zen Stone Plus suits active users that rank portability above song choice. It comes with 2GB of flash memory — good for around 500 songs — and is bundled with a clear gel skin that you can clip to your bag or clothing.

Creative has opted for a more grown-up look with the latest Zen Stone Plus. It still has the same shape and button layout, but the casing uses a demure matte finish, and the available colours — black, pink, blue and champagne — are more subdued.

Regardless of what Apple's marketing mavericks may claim, having a screen to navigate through your music library — however small — is infinitely better that not having one at all. Creative has incorporated a round OLED display on one half of the player, and the other half houses the five-way control pad.

The menu system is intuitive for the most part, but navigating through music can be a complicated affair.

The Zen Stone Plus supports all the major audio codecs, namely MP3, WMA, AAC and Audible. The voice recorder records in the MP3 format, but there's no option to record FM radio. On the whole, we were pleased with the Zen's audio quality. The bundled earphones don't do it justice, but plugged into a decent set of headphones it delivers strong bass and a pleasingly-clear mid-range.

Another tick in the Zen Stone Plus' favour is the quality of the built-in speaker. Considering the player's tiny size, it delivers a powerful sound from the rear-mounted grill that's louder than the speakers on most mobile phones. Also, importing music onto the device is nice and easy.

Jenneth Orantia

CONTACT	Creative
ONLINE	www.au.creative.com
MARKET	Everyone
PRICE	$84.95

✔ Speaker; OLED screen; good sound quality.

✖ Navigating can be frustrating.

8/10

Sony Handycam HDR-TG1E

The world's smallest and lightest 'true' hi-def video camera.

While we have often been critical of manufacturers that supply camcorders/handycams with low-level-lacking-in-features editing software, we think we have just found something worse; supplying time-restricted software made by your own company! How miserable is that? You buy a video camera worth $1,500+ and you still have to buy software to make it work beyond a month. And the cost of a disk and PDF manual is..?

That's exactly what you get when you buy a Sony HDR-TG1E, billed as the world's smallest and lightest 'true' hi-def video camera. Well, yes it does do 1,920 x 1,080, but that is interlaced (i) not progressive (p), so let's just agree that it is 'mostly' true HD.

The TG1E breaks away from the conventional barrel-shaped camcorder. Instead, it has an upright rectangular body with a flip out 2.7in touch screen LCD with a resolution of 960 x 220. Not brilliant resolution, and there is no viewfinder, but it does the job. Also making the TG1E different is that the body is made of pure titanium, thus being very resistant to scratching.

An added benefit of this design of camera is that it is equally easy to use for both left and right-handed users. The AVCHD format used by the TG1E is rapidly becoming the de-facto standard for consumer cameras and uses Sony's proprietary Memory Stick Duo format for storage. One can only wonder how long it will take Sony to switch from Memory Stick to the more popular SD format.

The TG1E contains all of the latest woo-hoo factor stuff such as face detection, a 'zoom' microphone, pre and post roll previewing (called Film Roll) and can back up to DVD via an optional backup DVD device. The downside of that is the backup gizmo is $300.

Specification-wise, it follows the standard Sony formula of Carl Zeiss Vario-Tessar lens, 10x optical zoom and a focal distance of 3.2-32mm in 16:9 aspect ratio. Focus is optional auto or manual and via the touch screen, spot focus and a spot meter are available, as are white balance options, exposure, and tele macro. Up-market features include zebra patterning, guide frames, shutter speed options and smooth slow recording. Connectivity options include HDMI, component, A/V and USB. A docking station is supplied.

If size is more important than features, and ease of use preferable to editing, the TG1E is a good choice.

David Hague

CONTACT	Sony
ONLINE	www.sony.com.au
MARKET	Everyone
PRICE	$1,599

✔ Small; ambidextrous use; fast start; high-def.

✖ Memory Stick; touch screen interface.

8/10

The Sony's unconventional shape lends itself to easy left or right-handed use.

Canon IXUS 80 IS

Boy, it's come a long way!

The IXUS name has become synonymous with Canon's range of pocket-able digital still cameras. 8.0 megapixels, face detection, red-eye correction and movement detection are par for the course for this little powerhouse, alongside a 3x optical zoom, optical image stabiliser and an ISO rating up to 1600.

As is now the norm, there is no viewfinder, however the 2.5in LCD screen is sharp and clear, and while bright outside sunlight was no impediment, low light conditions such as a dim room made the LCD revert to a grainy black and white image. Under both conditions though, all of the on-screen indicators are still clearly visible.

The controls of the IXUS 80 are logically laid out and it is obvious as to what each does. We don't however like the tiny ring zoom rocker surrounding the Go button: it's too fiddly for larger fingers.

The battery/SD card housing is plastic and feels a tad fragile. Certainly if it was open and was bent back a bit too far it would snap off; at least the cover for the AV/USB ports is on a flexible hinge avoiding this potential problem.

Battery charging is via a cradle, and Canon say the expected life with the supplied battery is 240 images.

The largest images that can be taken by the IXUS 80 is 3,264 x 2,448 pixels, making the picture suitable for up to A3 printing. A range of shooting modes are available including Macro, Portrait, Night Snapshot, Colour Accent, Colour Swap and Stitch, as well as 'Special Scenes' such as Kids and Pets, Foliage, Sunset, Aquarium, Underwater and Fireworks. PictBridge is supported.

The design, feature set and comfort factor of a camera in many cases is personal; what one person might like another may hate. As such, the final proof is in the pudding — or the image taken in this case. As most of the functions are taken care of by the camera, it's pretty much a no-brainer to use. If you want more control over your settings, buy a Powershot. But for $370-odd, you can't go wrong.

David Hague

CONTACT	Canon
ONLINE	www.canon.com.au
MARKET	Everyone
PRICE	$379

✔ 8MP; optical stability; good lens.

✖ Low light issues; a little fragile; zoom ring.

8/10

Canon EOS 1000D

What? Another smaller, cheaper, entry-level DSLR from Canon?

DSLR sales have picked up in the last twelve months, as made evident by Canon and Nikon's persistence in continuing to introduce new models into the entry-level market. As with the Canon 1000D, each new entry seems to keep getting smaller, simpler... and cheaper. With a now-standard 10.1 megapixels run through a Digic III sensor, the 1000D takes just as good a picture as its predecessor, the 400D which shares many of its key features and components.

New users are definitely the intended market, as the 1000D has been designed for ease-of-use, with a simplified 7-point auto focus system and the ability to shoot using Live View through the 2.5in LCD screen in the same way as you would use a digital compact. Quality hasn't suffered, even though the camera's ultimate performance has been reduced. With a slower three frames per second frame rate and slightly reduced 12-bit RAW compression, which most users will not notice or miss, the only function that we were left scratching our heads over was the removal of Spot Metering, which comes in handy for any DSLR user. However, it's not all bad news though: the camera still has sensor cleaning, good noise reduction for high ISO's and the ever-popular live view.

But, don't be put off. This is still a great camera for the price you're paying for it. Image quality is up to par with the 400D and the 450D, with good colour rendition and well-defined, sharp images under varying conditions. The Auto White balance works a treat and the live view image previewing comes in handy. In essence, this is a slightly pared-back version of the 450D, but the only things missing for the new DSLR user is the stuff that you wouldn't have bothered using anyway.

Christopher Zammit

CONTACT	Canon
ONLINE	www.canon.com.au
MARKET	Everyone
PRICE	$999.95 w/ 18-55mm lens

✔ Affordable; well made; good images; usability.

✖ Awkward grip; no spot meter; feels lightweight.

8/10

Affordable business projection, but be aware of its limitations.

Sharp XR-32S DLP Projector

A compact lightweight business projector with a bright image that does the basics.

CONTACT	Sharp
ONLINE	www.sharp.net.au
MARKET	SMB
PRICE	$1,299

✔ Built-in speaker; easy to use; bright image.

✖ Low res; poor sound; noticeable artefacts.

6/10

The Sharp XR-32S data projector is designed for business presenters on the move as it is relatively lightweight (under 3kg) and is very easy and quick to setup.

The front of the bright white unit has the lens with manual focus and zoom, remote control sensor and ventilation. The rear of the unit has a single VGA input (which means you will need a separate switch box if you use multiple computers), monitor out, S-Video and composite inputs and stereo audio inputs to drive the inbuilt mono speaker. There is also an RS-232C (serial) cable to allow you to control the projector from the computer and a USB mouse connector to allow you to move the mouse with the projector remote. A Kensington key lock attachment is also built in to secure the projector.

Setting up the projector is a no-brainer. Simply plug it in to the power, connect the computer and video sources using the supplied cables and turn it on. Whilst there are full controls over colour and brightness, the default settings are fine. The unit is quick to power on, taking around 30 seconds from plug in to near full brightness with a welcome screen to guide you through focusing and adjusting the zoom. If the projector is not perfectly aligned with the screen, this can be adjusted with the keystone correction function. You don't even need the remote, as most controls are duplicated on the top of the projector.

Whilst the unit is only SVGA (800 x 600) resolution, it will accept inputs up to SXGA (1,280 x 1,024) and widescreen (1,280 x 800), although these images are scaled. SVGA effectively limits the projector to PowerPoint-type presentations and standard-definition video. Forget spreadsheets or complex graphics, as SVGA just won't give you enough screen real estate.

Rated at 2,500 lumens, the image is bright enough to display well even in a reasonably well-lit room, provided the projector is not too far away from the screen. We tested it at three metres and found the image was quite viewable even in daylight. Sharp claims a contrast ratio of 2,000:1, which is adequate for video and more than what's required for presentations, although we found blacks were not as dark as we would like.

The projector uses DLP technology which provides for excellent colour rendition with a good range of greyscale; however, this projector, as is common with most single DLP chip projectors, suffers noticeably from the 'rainbow effect', where moving bright white objects leave a rainbow coloured trail behind them. Although this is subjective, some members of the audience will notice this effect more and consequently find long presentations strenuous to watch. The XR-32S also suffers from the 'screen door' effect where each pixel is surrounded by a thin, but noticeable border. If you are far enough away from the screen you probably wouldn't notice it, but in a small room, it can be very hard on the eyes. Although everyone will perceive things differently, we found that around 5–10 minutes of staring at the screen gave us noticeable eye fatigue.

Whilst the projector has a zoom lens to enlarge the image, at 1.15x, you might as well just move the projector, as it is not enough for anything. The other criticism is that the sound from the inbuilt mono speaker is so tinny you might as well just use yout PC's built-in speakers.

The unit is not expensive and will do the job if you need to do presentations or display short segments of video. It is quiet, produces a bright image and is claimed to run around 4,000 hours without needing to replace the bulb. However, if you need high resolution for detailed presentations or high-resolution video with quality sound, the XR-32S probably is not for you.

David Neiger

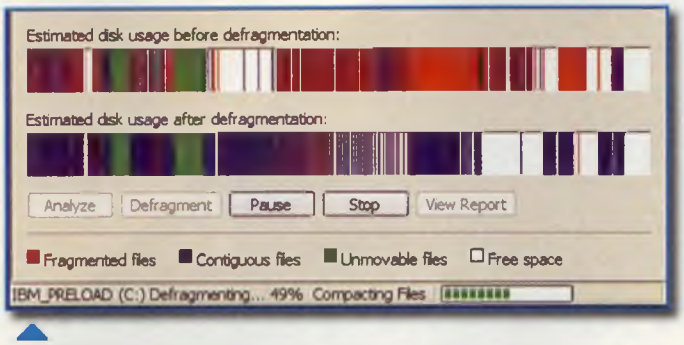
Why pay for defrag?

Most defrag tools promise big gains in PC performance, but do they really deliver?

When your new PC arrived it had a well-optimised hard drive, with most files packed together in solid blocks of data. As you installed and removed applications, though, files became fragmented, with individual chunks spread all over the disk. All those extra disk seeks soon slow down your PC, unless, of course, you run something to defragment the files and restore the PC back to its original performance.

That's the sales pitch for most defrag tools, anyway, many of which take this further by reordering your files. The data transfer rate for the outer cylinders of a hard drive can be twice as fast as the inner cylinders, so it makes sense to place the more commonly used data there. There are many possibilities, and so most defrag tools uses their own custom file reordering schemes, each promising to deliver better results than anyone else.

Exactly what sort of performance gain you might see is rarely made clear, though. And do third-party defrag tools really deliver any significant benefit over Windows' built-in, basic (but perfectly competent) defrag utility?



Vista Defrag: Most of the old XP-style interface has been dumped.

JKDefrag can be run from a bootable CD, letting you defragment more files.

DEFRAG BENCHMARKS

Measuring the speed benefits of defragging a hard drive isn't easy. There's no standard benchmark to apply, so for the purpose of this test we created our own.

We started with a Windows Vista PC and a 500GB hard drive that was 85 per cent full. This hadn't been defragmented in months, and to make it even worse we installed bulky applications like Microsoft Visual Studio and Adobe Flash CS3 Professional. The end result was a mess with over 1,500 heavily fragmented files. After taking an image backup of the disk, we identified the worst 1,000 fragmented files, and measured how long it took to read them.

Our first benchmark was now straightforward. All we had to do was defrag the system, read the same 1,000 files again and report any speed increase. We also ran a series of real world tests, such as timing startups and shutdowns. Finally, we restored the image backup ready to run another test.

THE RESULTS

Vista's own defrag tool gave an 18 per cent improvement in the best-case read times for our setup, but our real-world tests showed only a three per cent gain. Meanwhile, PerfectDisk 2008 Professional delivered a 25 per cent speed increase in the best case and an eight per cent improvement in the real-world tests.

We have our answer, then: commercial defrag tools can deliver better results than Windows' own utility. PerfectDisk 2008 Professional is reasonably priced and includes enough other useful features that it's worth the price. If you currently have no commercial defrag tool then consider buying this one: your hard drive will thank you.

Mike Williams

PRODUCT TEST 1

Windows Vista Defrag

Vista's GUI defrag tool has a very basic interface that gives no indication of when the defrag might end. Luckily, new low-priority CPU and disc I/O means it can work in the background while you run other things.

A minor tweak to the defrag algorithm means file fragments greater than 64MB will now be ignored: this should help reduce defrag times overall, and certainly the program's five-hour 18-minute defrag of our test system was faster than we'd expected. Performance tests saw the defrag deliver up to an 18 per cent improvement in read time (that's specific files, not the whole system), a very acceptable result.

SUPPLIER	Microsoft
ONLINE	www.microsoft.com
PRICE	Bundled with Vista

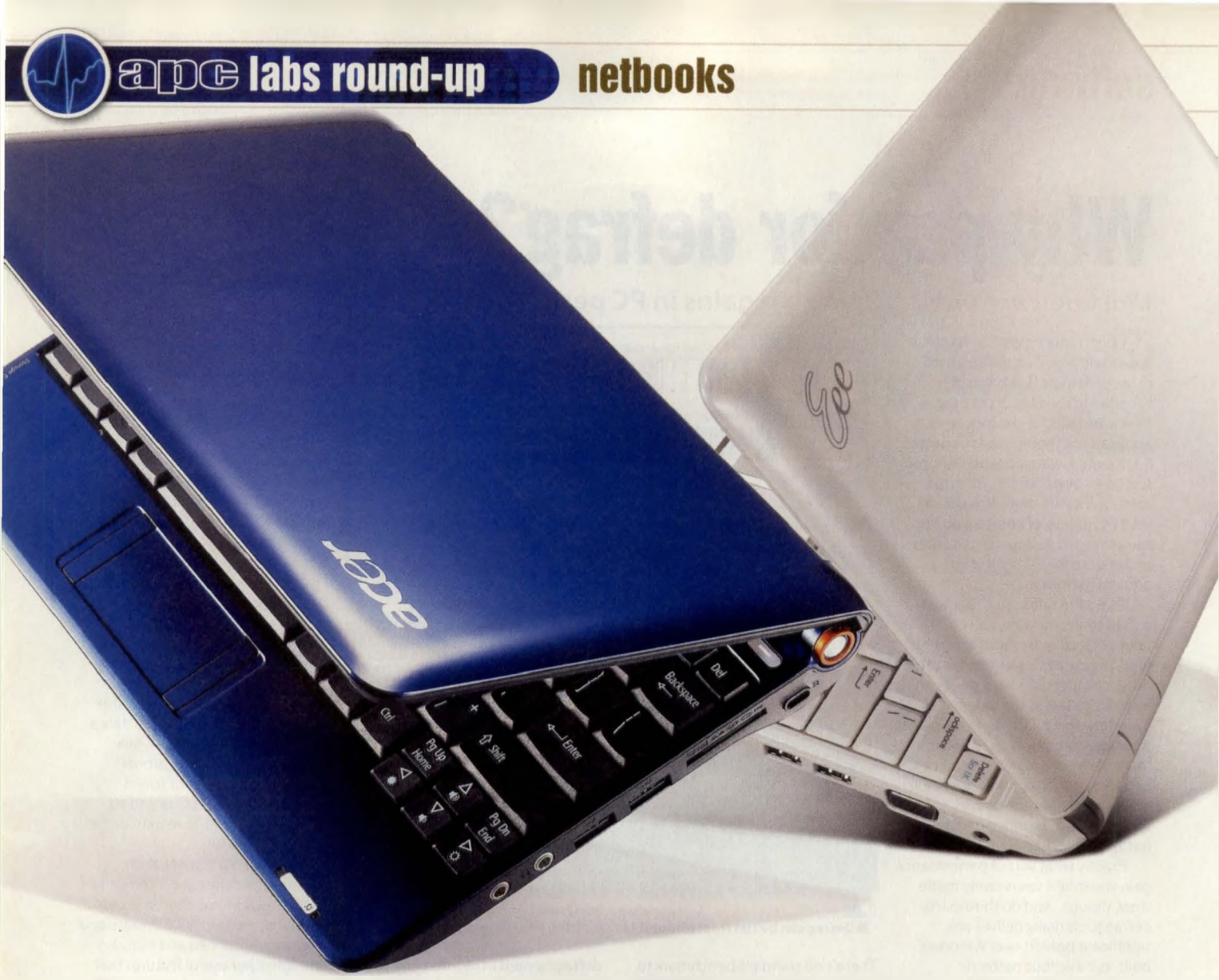
PRODUCT TEST 2

PerfectDisk 2008

PerfectDisk excels at hard drive analysis, providing an in-depth file report, and is highly compatible with Windows technologies.

The program generally runs very quickly, cleaning up our test system in four hours 25 minutes. It also organises files by their creation and modification dates, grouping old unchanged files together to reduce future fragmentation. It certainly improved our PCs performance, delivering up to a 25 per cent improvement in read speeds and around an eight per cent gain in real-world speed tests. Add tools to delete temporary and duplicate files and you've got one of the best defrag tools.

SUPPLIER	Raxco Software
ONLINE	www.raxco.com
PRICE	US$39.99



SUPER-CHEAP NETBOOKS

Laptops, notebooks, tablet PCs, UMPCs and now netbooks. *Jenneth Orantia* takes a look at the latest craze to see if they stand up to the big guys.

If you've been following the development of notebooks for the past few years, you'll know that the two major form factor spin-offs, Tablet PCs and UMPCs, never really took off as a viable alternative to the standard notebook design. Netbooks, on the other hand, came along incidentally as an offshoot of the ultra-low-cost laptop movement (pioneered by the OLPC XO-1) and are proving to be incredibly popular. ASUS was one of the first manufacturers to release a netbook with its Eee PC 701, and while it was originally designed as a cheap and easy-to-use laptop for students, its tiny form factor and unprecedented $499 pricetag had it jumping off shelves. The two main things that define a netbook are small size and low price, and they're a popular choice as a second laptop for traveling or field work, especially as they're cheaper than most smartphones. Their dimensions vary based on screen size, which can be anywhere between seven and 10 inches, and weight is typically around the one-kilo mark. The latest generation of netbooks will run you anywhere from $500 to just under a thousand dollars, but you can find an older model like the Asus Eee PC 701 for as low as $300.

HP Mini-Note 2133

The Mini-Note 2133 was the second netbook to make a splash after the original Eee PC 701, and its roomy 8.9in screen, 92% full-size keyboard, stylish aluminium casing and massive 120GB 7,200rpm hard drive made the Eee look like an amateur in comparison.

But now that the dust has settled and there are more competitors in the netbook space, a lot of the Mini-Note's shine has faded. Its main shortcoming is its use of the VIA C7-M processor, clocked at 1.2GHz. Paired to Windows Vista Business and 1GB of RAM, performance is extremely laggy, even for basic tasks like opening a new tab in Internet Explorer, streaming a clip from YouTube or launching the Control Panel. A PCMark05 score of 661 placed the Mini-Note second last for performance, but it felt like the slowest machine when it came to everyday usage. It also had the longest startup time of one minute and 37 seconds. The Mini-Note is available with a 1.6GHz VIA C7-M processor and 2GB of RAM for an extra hundred dollars, but HP would've done better to load it with Windows XP instead of Vista.

$899 **8.9in**

The lacklustre performance is a shame, as the Mini-Note 2133 is a great netbook in most other respects. From a design perspective, it looks the most expensive thanks to its brushed metal lid, magnesium alloy casing and frameless display. The LED-backlit screen is gorgeous with an above-average resolution of 1,280 x 768, and the speakers — located on either side of the display — are loud and rich-sounding. The system isn't fast enough to render standard XviD movies without encoding artefacts and stuttering, but otherwise, the excellent screen and audio make the Mini-Note a great little machine for multimedia. As for productivity, the resolution may be a bit too fine for some people and a strain for extended periods of working, as text appears very small on the screen.

HP made a big deal about the Mini-Note's keyboard when it first came out earlier this year, and rightly so considering how small its only competitor's keyboard was. Now, however, it's unremarkable, and while the keys are a good size, the travel feels a bit shallow compared to the other netbooks (save for the DreamBook IL1, which uses a much smaller keyboard). Most of the Mini-Note's base is taken up with the keyboard at the expense of the touchpad and mouse buttons; as a result, the touchpad is about three-quarters the size of a regular one and the mouse buttons have been repositioned to either side of the touchpad.

Three USB 2.0 ports have become the standard for netbooks, so the inclusion of only two on the Mini-Note is a bit of a let-down. It does have an ExpressCard 54 slot, however, which you won't find on any of the other machines, and the rest of the specs are fairly standard: 802.11a/b/g Wi-Fi, Bluetooth, Gigabit Ethernet, VGA webcam, SD card reader, VGA monitor port and headphone and microphone jacks.

The Mini-Note ships with a three-cell battery as standard, but you'll want to spring for the six-cell one if you'll be using it for long periods away from the desk. Our DVD run-down test (using an external drive) was short-lived at one hour and 41 minutes, and browsing over Wi-Fi wasn't much longer at two hours and 27 minutes.

HP's first netbook offering gets the hardware design down pat, but its performance needs a serious boost for it to be a viable contender — especially now that all the other notebook vendors are jumping into the market. Switching to the Intel Atom processor would be a good start, followed by ditching Vista for Windows XP.

The 2133's early advantage is starting to disappear.

CONTACT	HP
ONLINE	www.hp.com.au
MARKET	Everyone
PRICE	$899

✔ Attractive; large hard drive; great screen.

✖ Poor performance; expensive; battery life.

6/10

ASUS Eee PC 1000H

Mobile technology has taken an interesting turn when we start referring to a 1.45kg notebook as 'heavy', but that's the predicament we find ourselves in with the Eee PC 1000H. Like the Wind, it boasts a 10in screen, 80GB hard drive and 1.6GHz Intel Atom processor, but as it's larger and heavier than all the other units, it straddles the line between netbook and ultraportable laptop — and doesn't seem entirely comfortable in either camp.

The 1000H has the honour of being the first Eee PC without an RSI-inducing keyboard. The wide dimensions have been put to good use by incorporating a full-sized keyboard with delightful tactile feedback. Only a couple of the buttons have been squished on the right hand side — the Ctrl key is skinnier than the others and the Shift button has been cut in half. The touchpad and wrist area are both a good size, but the mouse buttons are stiff and the touchpad doesn't feel responsive enough, even after adjusting its sensitivity in the Settings. The multi-finger smartpad feature is a nice touch, and works similar to the MacBook Air in that you can use two- and three-finger gestures on the touchpad to scroll through long pages, zoom in and out of photos, and flick through images in a photo album.

New to the Atom-based Eee PCs (the 901 and 1000H) is a strip of buttons above the keyboard that turn the screen off, change the resolution, adjust clock speed and launch a program of your choice (Skype by default). The second and third buttons are the most interesting. The resolutions on offer are 800 x 600, 1,024 x 600 (standard), 1,024 x 768 and a 1,024 x 768 compressed mode that squashes the resolution so you can see everything on the screen without scrolling — handy for web sites and programs that assume a minimum screen height of 768 pixels. The third button launches the Super Hybrid Engine utility, which cycles through four power options that underclock and overclock the 1.6GHz Atom processor for better battery life or performance.

The 1000H also has a couple of features that the other netbooks don't have, namely Dolby Sound Room-certified stereo speakers and 802.11n wireless networking. The speakers — located underneath the lip of the netbook on the left and right-hand sides — are powerful but have an echoey quality and distorted treble and bass. Still, they're significantly better than the ones on its closest competitor, the Wind, which had trouble reproducing the vocals on music tracks.

We benchmarked the 1000H at its default 1.6GHz clock speed and over-clocked at 1.8GHz using the Super Hybrid Engine program. Problems with the graphics tests meant we couldn't get a total score for PCMark05, but it was a photo finish comparing the separate CPU, memory and hard drive tests between the 1000H and the Wind running at 1.6GHz. The Wind bested the 1000H by a slim margin for the second test, but the 1000H edged slightly ahead for the CPU and hard drive tests. Oddly, the results for the 1000H running at 1.8GHz weren't much different to the results at 1.6GHz.

The 1000H also did well in the video encoding test, taking 51 minutes to transcode an XviD file to MPEG-4, second only to the Sony, and it had the fastest startup time of 31.6 seconds.

Part of the reason for the 1000H's bulk is that it's got a 6-cell battery, and it's a good trade-off when you compare this netbook's run-time to those with a 3-cell battery. For our DVD run-down test (using an external USB drive powered off two of the 1000H's USB ports), it ran for three hours and 29 minutes, and for our wireless test it went for four hours and 27 minutes. This is using the default Auto power profile — switching it to power saving mode and dimming the screen below 40% should easily stretch battery life over the five-hour mark with Wi-Fi on.

Lighter notebooks with larger 12 or 13in screens and better performance and features are on tap from every notebook vendor, but you certainly won't find them at the 1000H's asking price. This latest Eee is a balancing act of a larger notebook's form factor and features with the budget pricing and extreme mobility of a netbook. It's around 50% heavier than other units we reviewed, but if you've got a tight budget and want an ultra-light laptop without sacrificing on comfort or features, the Eee PC 1000H is by far the best contender.

After creating the category, ASUS now redefines it with the 1000H.

apc Editor's Choice

$699 **10in**

CONTACT	ASUS
ONLINE	www.asus.com.au
MARKET	Everyone
PRICE	$699

✔ Keyboard; battery life; performance.

✖ Heavy for a netbook.

9/10

$549 10in

Would you L1? Sturdy casing, but no real surprises under the hood.

CONTACT	Pioneer Computers
ONLINE	www.pioneercomputers.com.au
MARKET	Everyone
PRICE	$549

✔ Long battery life; sturdy construction.

✖ Laggy; small screen and keyboard; unattractive.

5/10

Pioneer DreamBook IL1

The DreamBook IL1 (short for 'I'd Love One') is a curious mix of old and new components. The 7in screen, tiny keyboard and laggy 1GHz VIA C7-M chip are very 'first-gen' netbook, while the 1.8in 40GB Ultra-ATA hard drive and extended 6-cell battery are more in line with the latest netbook configurations.

Long battery life is the IL1's main appeal. It sports a large 7,600mAh battery that adds a hump to the bottom and extends one-and-a-half centimetres out from the rear, and in our DVD run-down and wireless tests it scored four hours and six hours and 38 minutes respectively. With wireless off and screen brightness all the way down, the IL1 could probably reach the notebook Holy Grail of eight hours battery life.

The IL1's pricing is in line with all of the other netbook offerings, but a complete lack of flair in the hardware design makes it look like a toy instead of a real computer. Everything about it looks tacky, from the silver trim around the lid and base to the upside-down Pioneer branding on the lid and matte black finish inside.

It has the same-sized keyboard as the Eee PC 701 and 900, but the chassis is about a centimetre wider, and the extra-thick bezel dwarfs the 7in screen and makes it look smaller than it already is. The hinge also creaks when you extend the lid all the way back. The upside to the IL1's design is that it looks extremely sturdy, and we wouldn't have any qualms about leaving it with a toddler to play with.

The keyboard isn't too bad after a bit of practice, but the touchpad and mouse buttons are difficult to use. We didn't think touchpads would get any smaller than the one on the Acer Aspire One, but Pioneer Computers proved us wrong with the IL1. The mouse buttons are thin slivers below the touchpad and they're possibly the loudest buttons we've heard on a notebook. It probably sounds like we're nit-picking, but try clicking them a few dozen times in a quiet lecture room or meeting and you're sure to get a few withering stares.

Pioneer Computers didn't cut any corners with the IL1's LCD: it's bright, with vivid colours and good viewing angles — but now that all the vendors have moved to 8.9in and 10in displays with 1,024 x 600 resolutions, the IL1's 7in 800 x 480 display looks tiny by comparison. Resolution switching is flexible compared to other netbooks, though, with the ability to upsize the resolution to 1,024 x 768 — although at that size, everything becomes tiny and difficult to read. Pioneer Computers is due to release an 8.9in netbook with the Atom 1.6GHz processor, but unfortunately it wasn't ready in time for this feature.

There aren't any surprises when it comes to the rest of the IL1's feature set. It runs Windows XP Home Edition (a Linux version is available for $50 less), has 1GB of 667MHz DDR2 RAM (non-upgradeable), and is equipped with 802.11b/g Wi-Fi, two USB 2.0 ports, VGA, 10/100 Ethernet, modem and audio jacks, a 3-in-1 memory card reader and a VGA webcam. No Bluetooth, unfortunately.

Like the HP, the DreamBook IL1 uses the VIA C7-M processor, clocked at a slower 1GHz. The IL1 scored 598 in PCMark05 (the HP scored 661), and at two hours and 17 minutes, it was slower than the Mini-Note by five minutes for the video encoding test. But web browsing felt snappier on the IL1 compared to the Mini-Note, probably because it runs XP instead of Vista. It still lags when you move between tabs, and Flash-heavy web sites slow performance down, but on a side-by-side comparison, the IL1 was quicker to render pages and switch between open windows.

Acer Aspire One

The Aspire One certainly clinches it in the looks department.

The award for best-looking netbook goes to the Acer Aspire One. It uses the same basic design as all the other netbooks, but there are small touches that make it stand out from the pack, not the least of which is its availability in blue, brown, white and pink. The lid, screen and bezel have a classy high-gloss finish, and, on the blue version, there are metallic orange rings around the hinge that add a sporty and eye-catching contrast to the rest of the netbook's colouring.

Currently, at time of writing, only the Linux version (with 512MB of DDR2 533MHz RAM and an 8GB flash drive) of the Aspire One is available, but an XP model with 1GB of RAM and a 120GB hard drive will be available in August. Both versions have the same 8.9in 1,024 x 600-pixel screen and run the new 1.6GHz Intel Atom N270 processor.

Acer has opted for the Linpus Linux Lite distro for its Linux-configured netbooks, which is similar to the launcher-style Xandros operating system used by the ASUS Eee PC, only with a distinctly more grown-up look to it. Programs are divided into four quadrants on the screen — Connect, Work, Fun and Play — and clicking on the arrow to the right of each section lets you see all of the programs within that category. All of the usual bases are covered for word processing, IM, multimedia, email and PIM, although we noticed that Skype isn't included.

The Aspire One certainly doesn't feel like a cheap notebook. The CrystalBrite LED screen has excellent contrast and colour, and the keyboard is close to full-sized and comfortable to type on – although a bit more cushioning underneath each key would've made it less clacky. The one sore point we have with regards to input is the undersized touchpad and mouse buttons. The Aspire One uses a similar configuration to the HP Mini-Note 2133 in that the mouse buttons are located on the left and right of the touchpad rather than below it. It's not a deal breaker, but it does take a while to get used to.

The standard set of three USB 2.0 ports, Ethernet (10/100), VGA and 5-in-1 memory card reader are found on the left and right edges of the Aspire One, but there's also a surprise visitor in the additional SD/SDHC card slot. The idea is that you can use the 5-in-1 memory card reader for transferring files from a digital camera or mobile phone, and the SD slot as a permanent storage expansion area — an outlet definitely worth exploring as the built-in memory only has 3.7GB free to store your files on. SD cards work in both slots, but when you put it into the dedicated SD reader, the system combines the Aspire One's SSD with the SD card into one pool of disk storage.

Wireless communication consists of 802.11b/g Wi-Fi only — sadly, it doesn't have Bluetooth built-in, but it looks like Acer will be adding 3G/HSDPA connectivity in future models judging by the SIM card slot beneath the battery.

The 512MB of built-in RAM isn't enough to play a DVD (using an external drive) without stuttering, but for web browsing, word processing and streaming clips from YouTube, the Aspire One is a snappy performer. A RAM door on its underside lets you add up to a gigabyte more memory, and, unlike the MSI Wind, it doesn't have a sticker over it that voids the warranty if opened. That's the good news. The bad news is that we noticed a distinct and persistent low-pitched buzzing sound while using the Aspire One that gets louder when the processor load spikes.

At 985g, the Aspire One is the lightest netbook we reviewed, but this is with the 3-cell 2,000mAh battery, which achieved a miserly one hour and 48 minutes for the DVD run-down test and 2.5 hours for the Wi-Fi test.

A 6-cell battery will be available for $99 in August, and this will replace the 3-cell battery for units shipping in October for the same $599 pricetag.

CONTACT	Acer
ONLINE	www.acer.com.au
MARKET	Everyone
PRICE	$599

✔ Stylish; great keyboard; vibrant screen.

✖ Battery life; limited on-board memory.

8/10

MSI Wind U100

One of the most eagerly-anticipated netbooks of the year, the MSI Wind, has finally swept onto Aussie shores, and for the most part it's been worth the wait. We tested the U100 version with the 10in screen, but an 8.9in version without Bluetooth is available (the U90) for fifty dollars less.

On a feature-by-feature comparison, the U100's closest competitor is the ASUS Eee PC 1000H, which has the same 10in screen, 1.6GHz Intel Atom processor and 80GB hard drive. But there are subtle differences between the two netbooks: the U100 is available in more colours (black, white, pink and a custom white version with love hearts on the lid), is smaller and lighter (1kg), and ships with a smaller three-cell battery. It's also limited to 802.11 b/g wireless and a VGA webcam, whereas the 1000H has 802.11n and a 1.3-megapixel webcam.

Both netbooks have a glossy lid and rounded edges, but the plain interior of the Wind looks bland compared to the 1000H. It's still a nice-looking machine though, and the Wind's smaller dimensions — which just scrape into what we think should be the maximum size for a netbook — make up for its lack of polish. Touch-typers will appreciate the Wind's generously-sized keyboard; however, some of the keys on the right-hand side are undersized, namely the comma, full stop and forward slash, and we found ourselves regularly hitting the wrong keys during testing. The touchpad is adequately sized, and the mouse buttons have just the right amount of resistance and travel to them.

The MSI Wind is equipped with a 1.6GHz Intel Atom processor, 1GB of DDR2 667MHz RAM and an 80GB hard drive, and it did well for the benchmark tests — although not as good as the Eee PC 1000H. PCMark05 didn't deliver a total score due to its requirement of a minimum 1,024 x 768 resolution, but the individual CPU, memory and hard drive tests showed the Wind as slightly better for memory but behind for CPU and hard drive. The Wind also took 20 minutes longer for the video encoding test and had a lengthier startup time of 47.5 seconds. Still, the performance difference between the two machines isn't huge, and in day-to-day use they felt equally responsive for web browsing and word processing.

The Wind's 10in 1,024 x 600 resolution screen is also very similar to the 1000H's in brightness and colour, and the pixel to screen size ratio is ideal for comfortable viewing for extended periods. The speakers, on the other hand, are terrible. Tinny speakers are par for the course on a portable, but we could hardly hear the vocal layer on most of the tracks we played. For Skype calls, we could barely make out what the other person was saying.

The rest of the Wind's features are run-of-the-mill: three USB 2.0 ports, headphone and microphone sockets, 10/100 Ethernet, VGA, a 4-in-1 card reader, 802.11b/g Wi-Fi, Bluetooth and a VGA webcam. The latter is adequate for video calls if you're in good lighting, but the lower resolution means there's a lot of flicker and graininess in the video feed.

The Wind U100's biggest disappointment is short battery life. As it ships with only a three-cell 2,200mAh battery, you can't use it for long periods away from its charger, which defeats the purpose of having a netbook. In our battery tests, the Wind lasted 1 hour and 43 minutes for the DVD run-down test (using an external USB drive) and 2.5 hours for the wireless test, which is similar to the Acer Aspire One but better than the HP Mini-Note 2133. According to the local MSI rep, the six-cell battery — which brings the Wind's weight up to 1.24kg — will be available in August for $100 and be available as standard with shipments from September onwards.

The Wind is much anticipated, but what about the battery life?

CONTACT	MSI
ONLINE	www.msicomputer.com.au
MARKET	Everyone
PRICE	$699

✔ Good performance; light carry weight;

✖ Limited battery life; awful speakers.

8/10

Sony VAIO TZ37

No, Sony hasn't entered the netbook game (yet), but we've thrown the VAIO TZ37 in as an example of the old guard of ultraportables. Off the bat, there are two key differences between the TZ37 and the netbooks on test: price and design.

At $3,599, the T37 costs a wallet-clenching three thousand dollars more than the average price of a netbook. That's a massive difference considering they're catering to the same type of casual web-and-email user, and a quick glance at the T37's specs don't seem to reveal where that extra money is going.

Put the T37 next to a netbook, however, and straight away you can see where at least part of the mark-up comes from. All of the netbooks we've looked at (save for the HP) are derivatives of the same design: chunky base, thick bezel, plasticky construction and rounded edges. The T37, on the other hand, is completely unique in its style, with a supermodel-slim profile, carbon fibre chassis, metallic lid (available in black, red and pink), and a MacBook-style keyboard.

The 11.1in LED-backlit display is a big jump up from the 8.9in-sized screens favoured by most netbooks, and it boasts a desktop-class 1,366 x 768-pixel resolution. This makes the T37 a more likely candidate for using as your primary machine — which you'd hope for given you're paying through the teeth for it. The only complaint we have for the screen is that it doesn't have enough support behind it, leaving us to question its durability. Also, when pushing the lid past its full opening, there isn't enough resistance in the hinge to prevent it from snapping under moderate pressure, and there's a worrying amount of flex on either side of the screen.

Part and parcel with a larger display is more room for the keyboard, and Sony has outdone itself in this area. The T37's keyboard is an absolute delight to use, with lots of cushioning and travel and everything exactly where you expect it to be. The keys aren't full sized, but since there's lots of space around each key, it's extremely comfortable and spacious to type on. The usual selection of function keys sit on the top row with shortcuts for volume and screen brightness, and there are separate buttons on the notebook's lip for multimedia playback.

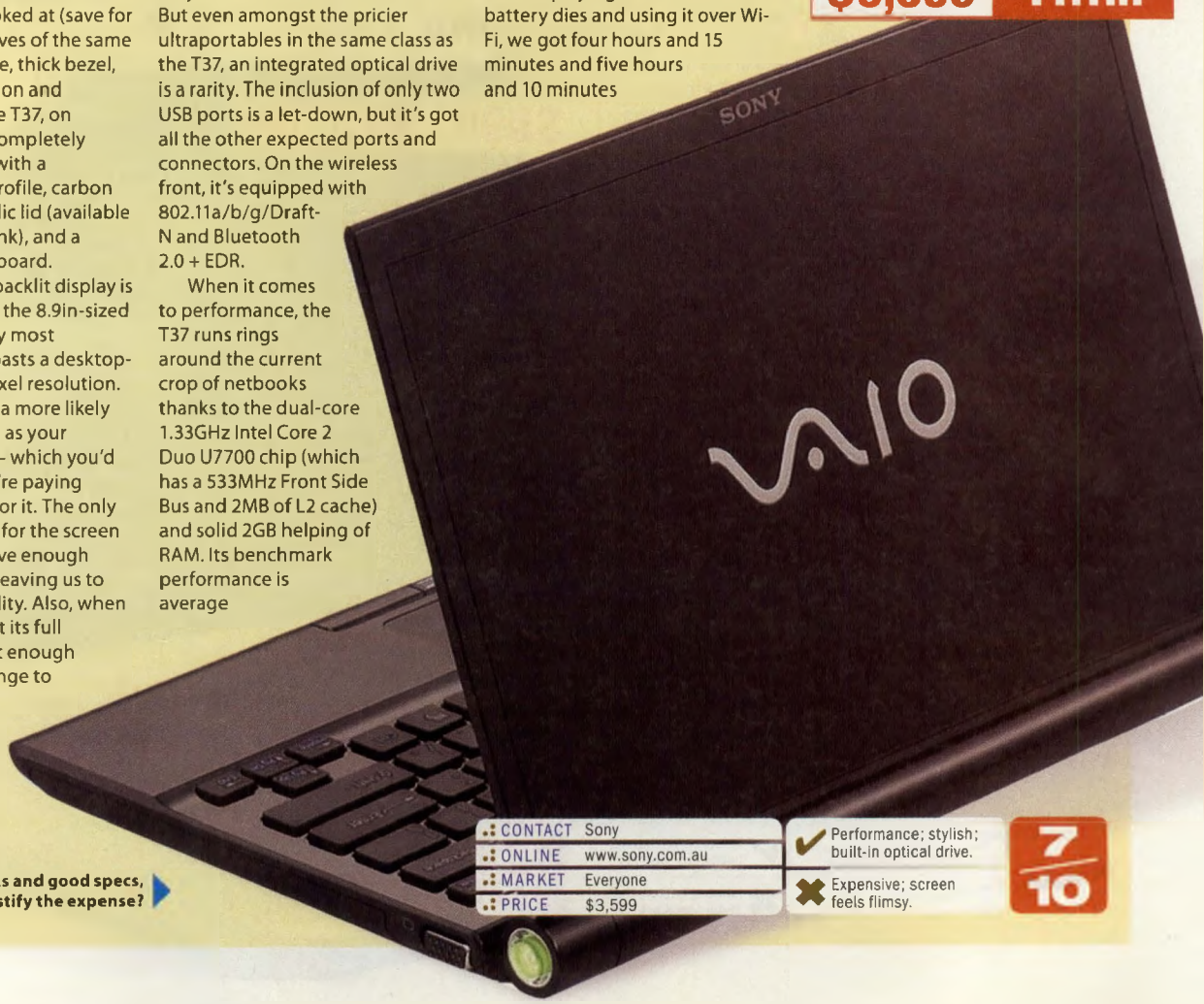
The T37 is thinner than any of the netbooks we tested, yet it's the only one with a built-in DVD writer. But even amongst the pricier ultraportables in the same class as the T37, an integrated optical drive is a rarity. The inclusion of only two USB ports is a let-down, but it's got all the other expected ports and connectors. On the wireless front, it's equipped with 802.11a/b/g/Draft-N and Bluetooth 2.0 + EDR.

When it comes to performance, the T37 runs rings around the current crop of netbooks thanks to the dual-core 1.33GHz Intel Core 2 Duo U7700 chip (which has a 533MHz Front Side Bus and 2MB of L2 cache) and solid 2GB helping of RAM. Its benchmark performance is average compared to other ultraportables — let down mainly by the slower 4,200rpm 120GB hard drive and integrated Intel GMA 950 graphics — but compared to the HP Mini-Note 2133 (the only other machine in this roundup to run Windows Vista), which scored 661 in PCMark05 and 73 in 3DMark06, the T37's results of 2,299 and 120 in PCMark05 and 3DMark06 respectively show it off as a much more capable machine. The T37 was also the fastest to encode a 700MB XviD file to MPEG-4 by a country mile with a total time of 27 minutes — the next-closest was the ASUS at 51 minutes.

Sony exaggerates the T37's battery life as having up to 11 hours run-time; in our tests, which involve playing DVDs until the battery dies and using it over Wi-Fi, we got four hours and 15 minutes and five hours and 10 minutes respectively with the standard 6-cell battery.

The T37 isn't for everyone, and the sudden rush of netbooks to market shows that you don't need to pay an absurd amount of money to get a lightweight laptop. That said, we don't think premium ultraportables like the T37 are going to disappear any time soon, although they may go down in price as the components become cheaper to manufacture. As the MacBook Air has proven, there are still lots of people willing to dig deep into their pockets for a sexy machine, and the VAIO T37's distinctive good looks make it a strong competitor in that niche.

$3,599 **11.1in**



Good looks and good specs, but do they justify the expense?

CONTACT	Sony
ONLINE	www.sony.com.au
MARKET	Everyone
PRICE	$3,599

✔ Performance; stylish; built-in optical drive.

✖ Expensive; screen feels flimsy.

7/10

HP recommends Windows Vista® Business.

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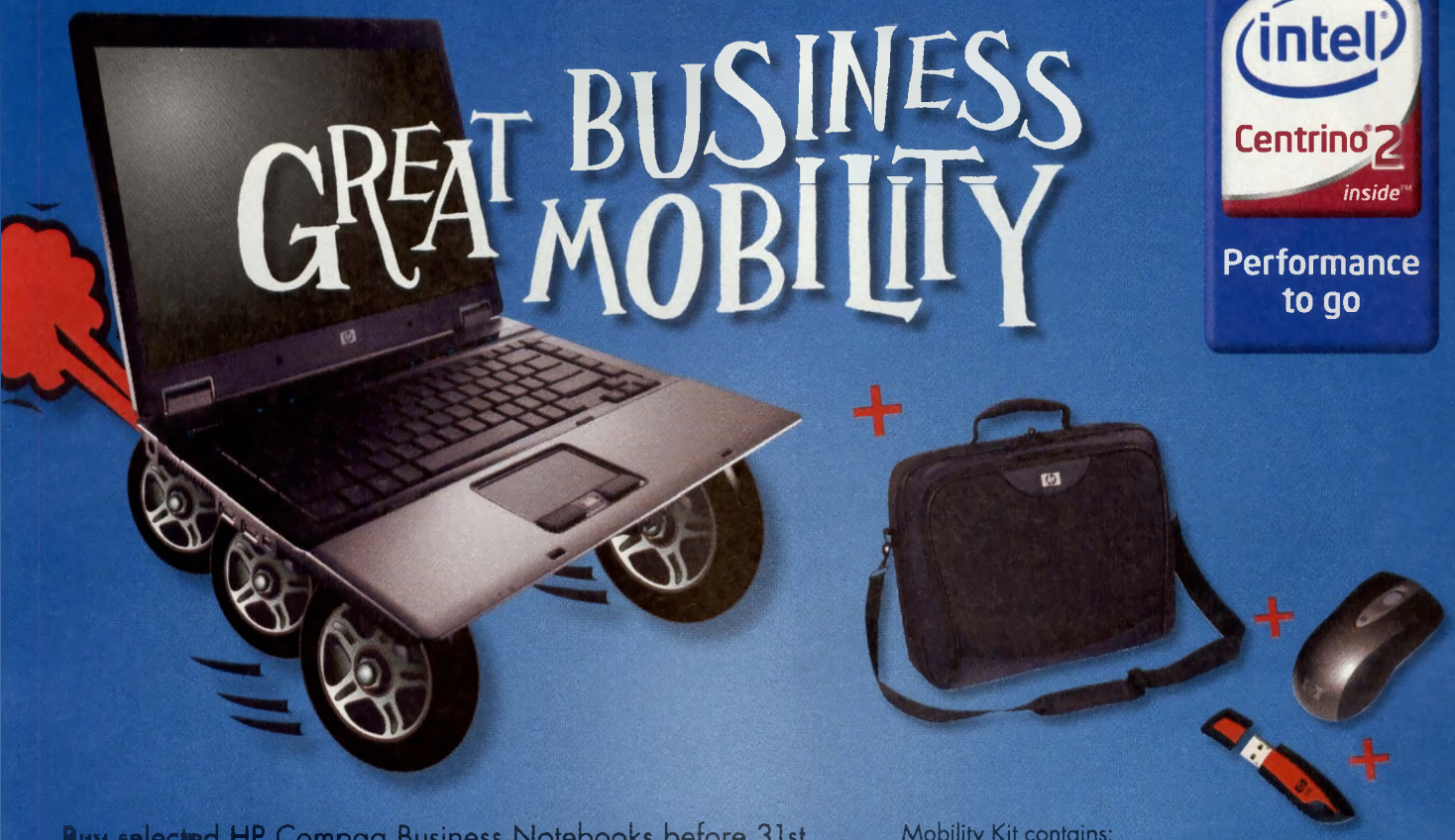

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- Intel® Centrino® 2 Processor Technology
  - Intel® Core™2 Duo Processor P8600 (+) (3MB L2 cache, 2.4GHz, 1066MHz FSB)
- Genuine Windows Vista® Business** (Downgrade to Windows XP Professional)
- Intel WiFi Link 5100 802.11a/b/g/n wireless LAN
- 15.4" WXGA+ AntiGlare Display
- 2GB Memory, 250GB Hard Drive
- DVD±RW SuperMulti DL LightScribe Drive
- Integrated Bluetooth
- Office Ready (free 60 day trial)
- 1 Yr international warranty with onsite support in Australia

HP COMPAQ 6730b NOTEBOOK PC

$1,999RRP*

PN FP585PA

- Intel® Centrino® 2 Processor Technology
  - Intel® Core™2 Duo Processor T9400 (+) (6MB L2 cache, 2.53GHz, 1066MHz FSB)
- Genuine Windows Vista® Business** (Downgrade to Windows XP Professional)
- Intel WiFi Link 5100 802.11a/b/g/n wireless LAN
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MP3 FACE-OFF

Jenneth Orantia takes a look at the current crop of MP3 players to discover the perfect portable audio solution.

MP3 players have grown up a lot since the early days of chunky hard drive-based portables. Now, the lion's share of players use flash memory, and they're available in a dizzying array of shapes, colours and storage sizes, with an assortment of extra features that you can expect on top of basic music, photo and video playback.

Apple's iPod music player still leads the game with four different types to choose from, but there are loads of other MP3 players worth considering. If you want an FM tuner or voice recorder, almost every media player except for the iPod offers it. Support for Bluetooth headphones and speakers is a feature offered by Sony and Samsung players, while memory card expansion — handy if you run out of built-in storage — is available on the SanDisk and Creative devices.

Format support is one thing you'll need to look for to ensure you can play all your files on it. MP3 support is standard across all media players, but AAC (the default format for CDs ripped using iTunes) and WMA (Windows Media Player's native audio format) compatibility differs between devices. Hardly any media players can play video files without transcoding them first on a desktop, so it's worth checking whether it comes with a file converter that actually works (in our testing, we couldn't get two of the programs working properly).

Finally, check whether it's compatible with your desktop platform — Windows XP and Vista is supported on all players, but Mac and Linux support is spotty.

Apple iPod Classic

When you've found a winning formula, why change it?

CONTACT	Apple
ONLINE	www.apple.com/au
MARKET	Everyone
PRICE	80GB: $319; 160GB: $449

✔ Sexy hardware design; extra-long battery life.

✖ Sound quality is mediocre; scratches.

8/10

$449 160GB

There's a reason why the iPod continues to be the number-one-selling MP3 player of all time, and it's got nothing to do with having the most features or offering the best sound quality. The iPod's phenomenal success comes down to being an exquisitely sexy gadget, with the most intuitive and user-friendly menu system and the excellent iTunes software that combines music management and content downloads into one easy-to use desktop application.

The iPod classic — named for its adherence to the traditional iPod design — is the sixth generation of Apple's hard drive-based player, and in a surprising break from convention, the original white colour has been put out to pasture in favour of faceplates in black or silver. The glossy plastic finish has also been replaced with anodised aluminium — the same material used on the iPod nano — although the backing is still the same scratch-prone stainless steel.

There isn't too much aesthetic difference between the iPod classic and the fifth-gen iPod: the front tapers at the sides and it's lighter and thinner, but the design is fundamentally the same. Storage has grown, so it's now available in 80GB and 160GB capacities, whereas its predecessor was only available in 30GB and 80GB.

The biggest change in the iPod classic is in its user interface. Content is still organised by type (music, video, photos, podcasts and extras), but half the screen is now taken up with floating images that relate to the content you're currently browsing through. In music, for instance, randomised album art appears on the right-half of the screen. It's a slick effect that makes using the iPod a more engaging and personalised experience, although there are still no options for customising the background or changing the iPod's menu style or themes.

The other major addition to the classic's user interface is Cover Flow for browsing through albums, providing a jukebox-style lineup of cover art that you can flip through using the iPod's clickwheel. Selecting any of the albums causes the artwork to flip over and present a list of tracks in the album, essentially simulating the process of picking out an album in a CD rack and turning it over to see what songs are on it. Of course, this feature's useless if you're not diligent about adding the album art to all of your music.

The iPod classic supports a healthy number of file formats: MP3, AAC, Audible, Apple Lossless, WAV, AIFF for audio and MPEG-4 SP and H.264 for video. iTunes makes the process of ripping audio CDs to electronic format extremely easy, but for video you'll have to either shell out $44.95 for the Pro version of QuickTime or turn to any number of free video conversion utilities that can transcode between different formats.

Audio quality has never been one of the iPod's strong points, but most users will be satisfied with its playback — especially if you're using the supplied earphones, which aren't sophisticated enough to highlight its sonic deficiencies. Videos, on the other hand, look great. At 2.5 inches — with a resolution of 320 x 240 pixels — the screen is just big enough to watch full-length movies on without getting a headache. Viewing angles are limited on both the horizontal and vertical axis, but the display is too small to share with someone else anyway.

The iPod classic's battery life is phenomenal. Playing a looped library of AAC tracks and with the screen turned off, it played for 44 hours and eight minutes before it shut down. Video playback was also impressive at seven hours and 35 minutes.

The iPod's excellent user experience doesn't end on the hardware side. One of the best things about the Apple MP3 players is their interaction with the iTunes desktop software. Not only does this make it dead-easy to load new tracks and playlists, but it also provides a huge library of both free and commercial content that spans music, TV shows, music videos, audio books, podcasts and games.

apc Highly Recommended

Apple iPod Nano

Now in its third generation, the nano is still a crowd pleaser.

- CONTACT Apple
- ONLINE www.apple.com/au
- MARKET Everyone
- PRICE 4GB: $189; 8GB: $249

✔ Wafer-thin, unique design; user interface.

✖ Not as full-featured as competitors.

9/10

$249 8GB

iPod nanos have traditionally been the smaller, less-capable versions of the larger iPods, but that's changed with the latest third generation model. Now, the only difference between the two are size and storage capacity. Functionally, the iPod nano and iPod classic are identical, making the former a great option for those that want all of the iPod's features in a more compact package.

The nano has always been the best-looking member of the iPod family, and it's also the one that's undergone the most dramatic physical changes between each new generation. The third-gen nano is wider than average but extremely thin. Pictures don't do it justice — you really need to see one in person to grasp how appealing its design is. Like the classic, it has an anodised aluminium faceplate that's available in six colours (silver, blue, pink, red, green, and black) and a stainless-steel back, and it comes in 4GB and 8GB storage capacities.

Compared to the last generation of nano, the third-gen nano feels sturdier and of a higher quality. The clickwheel is smaller than the one on the classic, but there's just enough room for the tip of your thumb to glide over the surface and press each of the four buttons, plus the centre select button is sufficiently large. The nano's tiny footprint makes it perfect for wearing around your neck or wrist, so we're disappointed it doesn't have a lanyard loop included on the body — instead, you'll have to invest in a case that offers this function, and to that end you'll find hundreds — if not thousands — to choose from.

On that note, another of the iPod's great appeals is the vast ecosystem of accessories it has available, including speaker docks, FM radios and transmitters, cases and add-on voice recorders. Other MP3 players don't come anywhere near this selection of after-market accessories, and this level of choice makes a big difference when you want to enhance or extend the iPod's functionality.

Supported file formats are identical to the iPod classic, namely MP3, AAC, Apple Lossless, WAV AIFF, Audible, MPEG-4 SP and H.264. Video playback is the main functional difference from previous versions of the nano, and thanks to its extra-wide dimensions, it manages to fit a 2in landscape-oriented screen with QVGA 320 x 240-pixel resolution. This is the same resolution used on the iPod classic, but everything looks sharper and clearer due to the smaller screen size.

As with the iPod classic, the nano features Apple's new split-screen menu system that puts content categories on the left hand side and a floating slideshow of related images (such as album art, video stills and photos) on the right. Cover Flow is also on offer for browsing through your music using the cover art of each album. You won't find a user interface that's slicker or easier to use, but we wish Apple would finally let us customise the background with wallpaper and apply different themes to the menus.

Another thing Apple has yet to include is a context-sensitive menu to access relevant options during playback. If you want to change the equaliser preset while a song is playing, for instance, you have to exit from the Now Playing screen, go into Settings and EQ. Plus, the iPod is one of the only MP3 players that doesn't offer a custom equalizer.

Most of the iPod nano's competitors include FM tuners and voice recorders as standard, but the nano makes up for it in other ways. It's one of the only MP3 players that you can buy games for, and there's an incredibly diverse range of free and commercial content available through iTunes. For its size, it also has great battery life: 33 hours for audio and six hours for video.

Creative Zen

Outstanding audio and the most features in this roundup.

CONTACT	Creative
ONLINE	http://au.creative.com
MARKET	Everyone
PRICE	2GB: $129.95 - 32GB: $349.95

✔ SD/SDHC memory card expansion; interface.

✖ Cheap-looking; memory card file organisation.

8/10

$349 32GB

As far as compact MP3 players go, the Creative Zen is the most full-featured of the lot. It's available in capacities from 2GB all the way up to 32GB, supports a wide range of audio and video file formats and is expandable via SD/SDHC cards — which currently max out at 32GB.

Unfortunately, the Zen doesn't get many points in the looks department, with a bland, credit card-shaped design, glossy plastic front and matte back — all of which gives it a cheap and nasty feel. Plus, it's only available in black, which is a change from Creative's usual practice of making lots of different colour combinations available.

Power on the gorgeous 2.5in screen, though, and all is forgiven. The Zen has the same-sized display as the iPod classic, with a 320 x 240-pixel resolution and support for 16.7 million colours. The lack of colour options for the player itself is somewhat made up for with a choice of six brightly-coloured themes for the Zen's menu system, and you can also customise the background with a photo.

The Zen's user interface is slick and delightful to use. The main menu displays each of the different functions, and selecting one generates a sub-menu overlay with options relevant to that feature. Menu navigation takes place using a simple but effective five-way control pad, and there are extra buttons to go back, bring up a context-sensitive menu and launch a shortcut, the latter of which is set to bring up the Now Playing screen by default. The Zen doesn't include any dedicated volume buttons, but the aforementioned shortcut key makes it easy to go back to the playback screen to adjust volume.

We're big fans of the Zen's context-sensitive menu, which brings up options and settings that are relevant to the screen you're currently on. From the Now Playing screen, for instance, it brings up a heap of useful options that include looking up the artist (to see what other songs and albums they have in your library), adding the track to a playlist, and turning on shuffle or random. If you've got lots of music and videos stored on the Zen, you'll also appreciate the alphabet down the right-hand-side of content listings, letting you jump to different letters quickly rather than manually scrolling through the list from top to bottom.

The Zen supports MP3, WMA, AAC, WAV and Audible for audio, and video support is limited to WMV, although the included software can transcode other formats like DivX and XviD. Creative players have a reputation for offering outstanding audio quality, and the Zen keeps to tradition with tight, punchy bass, sparkling highs and clear, richly detailed mids. Videos have excellent contrast and colour, and playback is silky-smooth at 30 frames a second.

One of our favourite features on the Zen is the SD/SDHC card slot for adding more memory, but it's let down with usability problems. For starters, files stored on the card aren't integrated with the rest of your content library and instead are shunted off into a separate Memory Card section in the main menu. Browsing via ID3 tag for music is also thrown out the window in favour of file folder browsing, and if you're playing a song from the memory card and move from the Now Playing screen to another section — photos, for example — the track stops playing.

In addition to music, photo and video playback, the Zen includes a voice recorder, FM radio, calendar, tasks and contacts display (achieved by synchronising Outlook items from your desktop) and a simple date and time screen. Battery life is rated at 30 hours of music and five hours of video, which is pretty spot on — in our testing, we achieved 31 hours for music and four and a half hours of video.

iRiver L-Player

The size of a matchbox, this is the affordable player.

- CONTACT iRiver
- ONLINE www.iriver.com.au
- MARKET Everyone
- PRICE 2GB: $99 - 8GB: $199

✔ Tiny; cheap; extensive codec support.

✖ Buttons could be more responsive; battery life.

7/10

$199 8GB

If you want the smallest possible player with the largest possible screen, look no further than the iRiver L-Player. This portable media player is literally the size of a box of matches — only not as chunky — with a façade that's completely taken up by a 2in colour display. Looks-wise, it's essentially like the iPod nano, only a bit thicker and cut in half so it's only got the display. Playback and navigation buttons are cleverly hidden behind the screen, such that pressing any of the edges triggers a control that's labeled on the display. From the main menu, for instance, pressing the right edge is the equivalent of selecting the currently highlighted item.

This is the same D-Click system used in iRiver's old Clix media player, but it's not as responsive – sometimes you have to press the controls a couple of times before it registers. Volume buttons are located separately on the underside of the player, but as it doesn't have any dedicated playback buttons, you have to navigate to the Now Playing screen if you want to change tracks or pause the song.

In the L-Player's favour is its ultra-low pricetag. The 2GB version is available for $99, the 4GB $149 and the 8GB $199. By comparison, the 4GB iPod nano costs $189 and the 8GB $249. For the price, the L-Player offers most of the features you'd expect in a portable media player, including music, photo and video playback, an FM tuner (with support for recording in WMA at different bitrates), voice recorder and text viewer. Codec support in particular is extensive, with MP3, WMA, Ogg, ASF and FLAC support on the audio side and MPEG-4 SP, WMV SP and XviD SP support on the video side, although you need to run movies through the converter software before they'll play on the device. As for colour choice, it's available in black, light pink, white and chocolate brown.

The supplied earphones don't do the L-Player any favours with regards to audio quality, but connected to our Ultimate Ears Super.fi 5 Pro earphones, we were pleased with the richly textured sound. Vocals sound clear and detailed and bass response is good, although the treble has a distinct hiss. The L-Player certainly doesn't lack for audio options, with lots of equaliser presets, a customisable 5-band equaliser and SRS WOW HD, and we like that you can hear the change each equaliser preset makes to the currently playing track before you actually select it. Videos also look great on the L-Player's screen, with vivid colours, wide viewing angles and excellent contrast and detail.

The L-Player's user interface is simple but classy, and for the most part it's easy to pickup and use. A few of the features require consulting the user manual however — bringing up the context-sensitive menu during music playback requires pressing and holding on the right edge, for instance. Music is organised by tags like artists, song name and album, but the L-Player also offers the option of browsing through content by folders. Customisation is limited to two themes that only change the menu style rather than the colour scheme.

Transferring content to the L-Player can be done through Windows Media Player or via drag and drop. The drawback to having such a small player is that the battery is correspondingly small also. Playing a looped library of MP3s, the L-Player ran for 10 hours and 23 minutes before dying. For video, it lasted three hours and 48 minutes.

Samsung P2

The most customisable, and some would say the prettiest.

CONTACT Samsung
ONLINE www.samsung.com.au
MARKET Everyone
PRICE 4GB: $249; 8GB: $319

✔ Outstanding audio quality; large screen.

✖ Bundled software is rubbish; touchscreen.

9/10

$319 8GB

Sitting at the top end of Samsung's media player range is the P2: a slim, candy bar-shaped MP3 player that's available in black, white and maroon, in 4GB and 8GB capacities. It's the most expensive of the MP3 players we reviewed for this feature on a per-gigabyte basis ($249 for the 4GB and $319 for the 8GB), but the premium is justified when you take into account the P2's extensive features and capabilities.

For starters, the P2 has a larger 3in display that boasts a high 480 x 272-pixel resolution. Plus, it's a touchscreen, which accounts for the player's almost button-free visage. Volume controls, a hold switch and play/pause/power button can be found on either side of the P2, but the front is spare save for the portrait-oriented touchscreen and a light indicator that flashes different colours depending on whether it's charging or playing music.

Another treat is the built-in Bluetooth for connecting wirelessly to compatible headphones and speakers. Unlike the Sony, it doesn't come with Bluetooth headphones in the box, but it does let you transfer media files from other Bluetooth devices like mobile phones and laptops on top of the wireless stereo streaming feature.

The P2 was originally meant to have mobile phone integration so you could use it as a hands-free device, but the firmware update that enables this still hasn't been released.

The P2 has one of the most customisable user interfaces we've come across, with three different menu styles, three fonts and the ability to use photos as wallpaper. You can also choose the graphic that appears on the Now Playing screen, including large album art, a graphic equaliser and one of four cool visualisations. It's definitely a good-looking menu system, but navigating through long lists can be frustrating as the scrollbar doesn't always respond to your finger dragging in either direction on the screen.

You can move between tracks or photos by swiping your finger horizontally across the display, but for some reason it does the opposite of what's expected — swiping it from left to right, for example, brings it to the previous track or photo, and vice versa.

The P2's 3in screen makes it longer than most other MP3 players of this class, but it's slender enough to fit comfortably in your pocket or hand. One thing to watch out for is fingerprints — the glossy coating on the front looks great, but as it's a touchscreen device, the front surface gets marred by fingerprints quickly.

As for file support, the P2 is conservative, offering MP3, WMA and Ogg for audio, WMV and SVI (a proprietary Samsung format) for video and JPG for photos. But this is more than made up for with the P2's exceptional audio quality — the best of all the MP3 players we tested. The bundled earphones are better than average, but connected to a decent set of headphones like our Ultimate Ears Super.fi 5 Pros, the P2 blew us away with its clarity, depth and bass response.

Based on the P2's preloaded videos, video quality is excellent as well; however, we couldn't get the included Samsung Media Studio software to convert any of our test videos. We'd advise steering clear of this software anyway — it's too slow and difficult to use. The beta version of the replacement software, EmoDio is just as bad. It mounts as an MTP device in Windows so you can drag and drop files to it or use Windows Media Player 11, but unfortunately Mac and Linux support is left off the menu.

The P2 fell quite a bit short of Samsung's estimated 35 hours of audio playback — in our tests, we only got 19 hours, and that was with the display turned off and no skipping between tracks, both of which reduce battery life even further.

SanDisk Sansa Fuze

A nano clone without the finesse.

CONTACT SanDisk
ONLINE www.sandisk.com
MARKET Everyone
PRICE 4GB: $180; 8GB: $230

✔ microSD/SDHC expansion; battery.

✖ Poor screen; video converter software.

6/10

$230 8GB

There's no getting around it: the SanDisk Sansa Fuze is a pretty blatant iPod nano clone. It's taller, narrower and thicker than the Apple player but has a similar screen and button layout and is also available in multiple colours (silver, red, blue, pink and black).

Still, the Fuze undercuts the nano by a few dollars for the 4GB and 8GB versions (as well as coming in a 2GB version) and offers enough extra features to make it a worthy contender. In addition to the standard FM radio and voice recorder that all MP3 players save for the iPod seem to offer, it supports WMA music tracks, offers a five-band customisable EQ and — best of all — has a microSD card slot for adding more memory.

The latter feature is hardly a surprise given that memory cards are SanDisk's bread and butter, but the Sansa Fuze does a better job of it than the Creative Zen (which offers an SD/SDHC card slot) by integrating any files stored on the card with the rest of your content libraries.

While it apes the nano's basic design, the Fuze sticks to a high-gloss plastic for the front and a rubberised plastic for the back — a combination that isn't quite as sexy as the nano but still attractive in its own right. The wheel on the front is mechanical rather than touch-sensitive, and it has a glowing blue ring around it that borders on tacky.

It's only when you power the Fuze's 1.9in screen on that the difference between it and the nano really becomes apparent. While the user interface has improved from previous Sansa MP3 players, it's still cartoonish and dull-looking — a shortcoming that isn't helped by the Fuze's low-res 224 x 176-pixel screen. For the most part it's easy to navigate through, but because the scrollwheel doubles as a five-way controller, the labels sitting around the wheel don't always correspond to the action that happens when you press it. Worse, it doesn't have dedicated volume or playback buttons, so the only way to adjust volume, pause or skip the track is from the Now Playing screen, and there's no easy way to jump directly back to this if you leave it to change a setting or view photos.

The Fuze doesn't throw out any surprises when it comes to compatible audio formats, with support for MP3, WMA, WAV and Audible. It can't play any video or photo formats natively, which is a pain — instead, you have to run them through the Sansa Media Converter before they'll play on the Fuze.

We were pleasantly surprised with the audio quality on the Fuze: there's a bit of distortion at the high-end and mid-range — especially when you crank the volume — but the bass is punchy and there's enough detail to satisfy most listeners. There aren't any sound enhancement features like Bass Boost or virtual surround sound on offer, but there is a decent selection of equaliser presets as well as a customisable EQ included.

The Sansa Media Converter (a separate download from the SanDisk web site) is required for transcoding videos and photos to a format playable on the Fuze, but we had zero luck in getting it to recognise any of the videos in our test library, which includes MPEG-4, DivX and XviD files. A quick search around discussion forums online reveal that this is a problem, but you're not missing much, the Fuze can only display videos at 20 frames a second, plus it's at a low 224 x 176-pixel resolution with limited contrast.

SanDisk rates the Fuze's battery life at 24 hours for audio and five hours for video — we weren't able to test video run-time due to problems with the media converter, but music surpassed SanDisk's estimates at 29.5 hours.

Sony Walkman NWZ-A826

A player with limited features, but it does them well.

CONTACT	Sony
ONLINE	www.sony.com.au
MARKET	Everyone
PRICE	$289

✔ Built-in Bluetooth; bundled headphones.

✖ Bluetooth headphones are flimsy.

8/10

$289 **4GB**

Sony practically invented the concept of portable audio with its Walkman series of cassette players in the late '80s, yet in the new age of digital music, it lags behind Apple and most of the other PMP manufacturers. The Walkman NWZ-A826 isn't about to change the company's fortunes on that front, but it's a feature-rich player with excellent sound quality that's bested only by the Samsung P2.

The NWZ-A826 has only one configuration: black, 4GB. Like the Samsung P2, it offers built-in Bluetooth 2.0 for connecting to wireless headphones and speakers, but it goes a step further by including the DR-BT21G Bluetooth headphones in the box — worth $129 separately. These use the street-style behind-the-head design favoured by many of Sony's consumer headphones, but the band feels flimsy and prone to breakage. Sound quality is also very average, so they're definitely something you'd use for convenience only. Thankfully, Sony also bundles regular earphones that sound a lot better.

On a more positive note, Sony has done a good job at simplifying the process of pairing the headphones with the Walkman: simply press the Bluetooth button on the right-hand edge of the player, and it'll automatically find the headphones. Controls on the right cup control volume and track skipping, and the band can be folded to make the headphones more portable. The NWZ-A826 works with other Bluetooth headphones and speakers, of course, but these need to be set up manually in the settings.

From a features standpoint, the NWZ-A826 is limited in that it does music, photos and videos only. What it can do, though, it does extremely well. On the audio front, it supports MP3, AAC and WMA. Sony has equipped it with a few sound enhancement technologies that make a big difference to playback quality, including Clear Bass, Clear Stereo, DSEE (Digital Sound Enhancement Engine) and Dynamic Normaliser, the latter two specific to restoring some of the detail that's lost in compressed music tracks. You can preview the effect that each technology has on music before selecting it, and while only four equaliser presets are available, it shows a graphic equaliser on the bottom half of the screen so you can see the changes each preset makes, plus there are two custom EQs that you can tweak yourself.

Most of these settings are available from the Now Playing screen by pressing the Option button, which brings up a context-sensitive menu. Music has a wonderfully rich and warm quality, with smooth vocals, tight bass and great instrumentation separation.

Video is equally impressive: movies play at full screen at 30 frames per second, and colours, contrast and clarity are all excellent. Formats supported are the same as with the iPod: MPEG-4 and H.264, but they need to be encoded at the NWZ-A826's native 320 x 240 resolution to be compatible.

Ease of use is another thing the NWZ-A826 excels at. Sony has opted for a mobile phone-style menu system with a 3 x 3 grid of icons on the home screen that you can browse through using the five-way control pad, back button and option key. We also like the use of large high-contrast text on every screen, saving you from having to squint while you're using it. The NWZ-A826 isn't exceptionally attractive or eye-catching, but it looks and feels like a high-quality product, with a sturdy aluminium enclosure, a bright and vivid screen and well-designed buttons. Battery life is also exceptional at 33 hours for audio and 7.5 hours for video.

The NWZ-A826 mounts as a standard USB storage device, so it's compatible with Windows, Mac and Linux. Oddly, it doesn't support playlist creation from the device itself — while it has a separate Playlist icon on the home screen, you have to create playlists on a desktop and transfer them manually to the Playlist folder.

SUPERCHARGE VISTA &

Mike Williams delves under the hood to reveal how taking command of the Windows kernel for both XP and Vista makes for a slicker, more-efficient and more-powerful PC.

According to Microsoft, understanding how Windows works is no easy task. If you're a regular home user, they imply, there's no need to worry your pretty little head about such technicalities. Get back to playing games and browsing the web: leave the clever stuff to us.

Of course, this isn't entirely true. Sure, most people won't gain anything from studying the data structures that surround a Windows process, for example. However, learning just a few fundamentals can help you to improve your PC's performance, troubleshoot problems and diagnose — or prevent — system crashes. And you don't need a degree in computer science to understand these ideas, either.

THREAD COUNT

Press Ctrl+Shift+Esc to launch Task Manager, click the Processes tab and you'll see a lengthy list of programs running on your system. Click 'Show processes from all users' (on Vista) and you'll add even more, a total of over 60 on our test PC. That's a busy setup, but the reality for your processor could be even worse.

The fact is that a Windows process doesn't 'run' anything at all. It's just a collection of data relating to a program. Every process contains at least one thread, though, and it's this that executes program code. Click 'View > Select Columns', find and check the Threads box, click 'OK' and you'll see that virtually all your processes have more than one thread. And many have considerably more: numbers of 10, 20 or 30 are by no means uncommon. Our test system had more than 600 threads listed, without opening a single application.

This doesn't mean all 600 threads want to run simultaneously, though, and Task Manager can reveal this too. Click 'View > Select Columns', check 'CPU Time' and click 'OK': you'll see most processes have very little or no recorded CPU use at all. These are like Windows Services, set up and ready to run, but not actually consuming any CPU time until you need them for something.

Still, even if some threads are dormant, there will often be more running than your CPU can handle at once. So how does the system decide which thread gets the most attention?

SCHEDULING ISSUES

Windows assigns every thread a 'quantum', which is a length of time that it's allowed to run before another thread may get a turn on your CPU. Consumer editions of Windows use a short quantum, perhaps 20 milliseconds, which means no task should be able to grab the processor for very long.

The system also triples the quantum of the foreground application, so its threads get 300 per cent more CPU time than the competition. That's a good way to ensure that whatever program you're working on stays snappy and responsive, but there's a price to pay.

Every time your CPU swaps threads it must also perform a context switch, where it saves the state of one thread and then recalls the state of the next. And this takes a short — but still measurable — amount of time. A short quantum makes for a responsive interface but also increases the overhead for your CPU. It spends a lot of time just managing the system rather than getting on with running your threads.

As a result of this issue, Microsoft Server products use a long quantum, six times longer than consumer Windows, and so make far more efficient use of the CPU. Sounds useful? It's easy to try this for yourself.

Open the System applet in Control Panel, click 'Advanced' (then 'Performance Settings > Advanced in Vista') and set 'Adjust for best performance of' to 'Background services'. Windows will now set your PC to use a long quantum with no foreground boost. This means reduced CPU overheads and better overall performance, especially on systems that run a lot of programs.

However, the new setting might mean that some programs become more jerky or games begin to stutter. If it doesn't work for you, then there's a Registry setting you can tweak: 'HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PriorityControl\Win32PrioritySeparation'. Setting it to '16 (Hex)' delivers a long quantum with a high foreground boost to combat jerkiness. See the table on the page overleaf for more options.

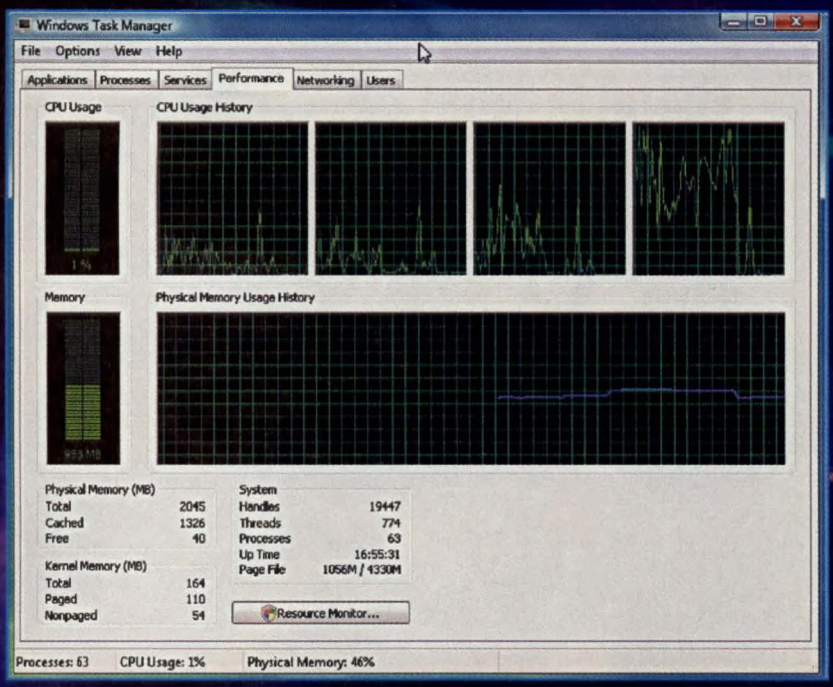
PROCESS PRIORITY

Quantums are interesting, but the real key to thread scheduling lies in its priority. When a program is launched, its process is assigned one of six priorities: Realtime, High, Above Normal, Normal, Below Normal or Idle. Each thread for the process then inherits this priority, which is used to determine which one runs next. A High priority thread will usually be preferred to one with Normal priority, for instance.

Won't this mean some threads run all the time? Not quite. Most threads only have a limited task to perform — like 'spell check this document' — and at some point they'll be finished. And if a thread accesses hardware, perhaps opening a file, then it may enter a wait state until the device returns some information. Windows notices this and schedules another thread to run in the meantime.

In addition, a Windows component called the Balance Set Manager runs every second, looking for threads that haven't had any recent CPU attention and giving them a temporary priority and quantum boost. You'll probably have seen this at work yourself, when a process seems to grab 100 per cent of your CPU time, yet other programs still respond — though very, very slowly. That's the Balance Set Manager kicking in.

It can be useful to tweak process priorities for yourself. If a rogue process starts grabbing



Task Manager lets you take a quick look at what's running on your PC.

Win32Priority SEPARATION OPTIONS

VALUE (HEX)	QUANTUM	FOREGROUND BOOST
14	Long	None
15	Long	Medium
16	Long	High
18	Long	None
24	Short	None
25	Short	Medium
26	Short	High
28	Short	None

100 per cent of CPU time, press Ctrl+Shift+Esc to launch Task Manager. Select the Processes tab and click the CPU column header (click 'View > Select Columns' and check 'CPU' if you don't see it) to sort by CPU use, so you can easily spot the resource hog. Then right-click that process and choose 'Set Priority > Below Normal'. This should allow other threads to be scheduled again, letting you regain control of your PC.

You can also use 'start.exe' to launch processes with the priority of your choice. To do so, right-click your program shortcut and modify the Target to something like: cmd.exe /c START /low c:\path\app.exe.

Use '/low' for a process that you don't want to grab CPU time, or '/high' when speed is vital. Boosting a thread's priority to High can give you a five or 10 per cent performance gain, but use this technique sparingly: remember, you're borrowing these CPU cycles from other processes and these will be slowing down. Many Windows processes also work at higher priorities and if they're blocked because you're running a game, say, your system could crash. Our advice: run only one priority-boosted app at a time and experiment with the new setting for a while before you assume that it's stable.

CPU AFFINITY

Running a process at a low priority can be taken too far in cases where processor attention is limited so much that the program gets almost no work done. However, there is another way to free up your CPU's time. Virtually all modern PCs now come with either a dual- or quad-core CPU. These provide two or four physical processors,

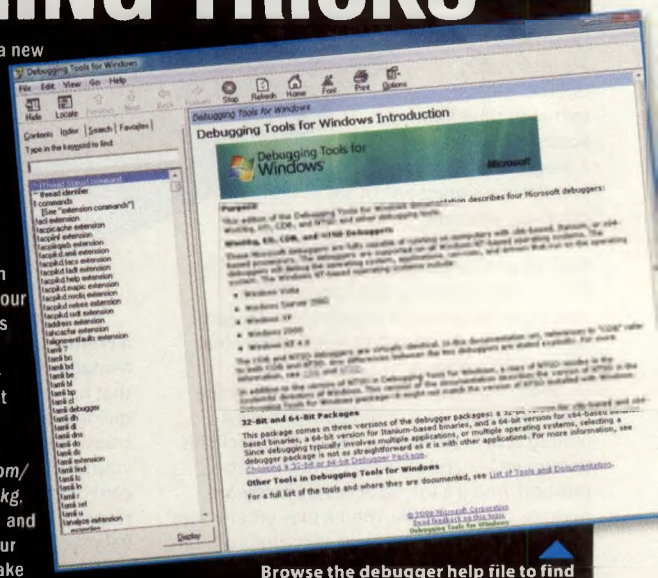
ULTIMATE DEBUGGING TRICKS

We saw how a Windows debugger can analyse a crash dump file to help troubleshoot your PC problems. However, if your problem program just hangs then you won't have any crash file to analyse. The solution? Trigger one yourself.

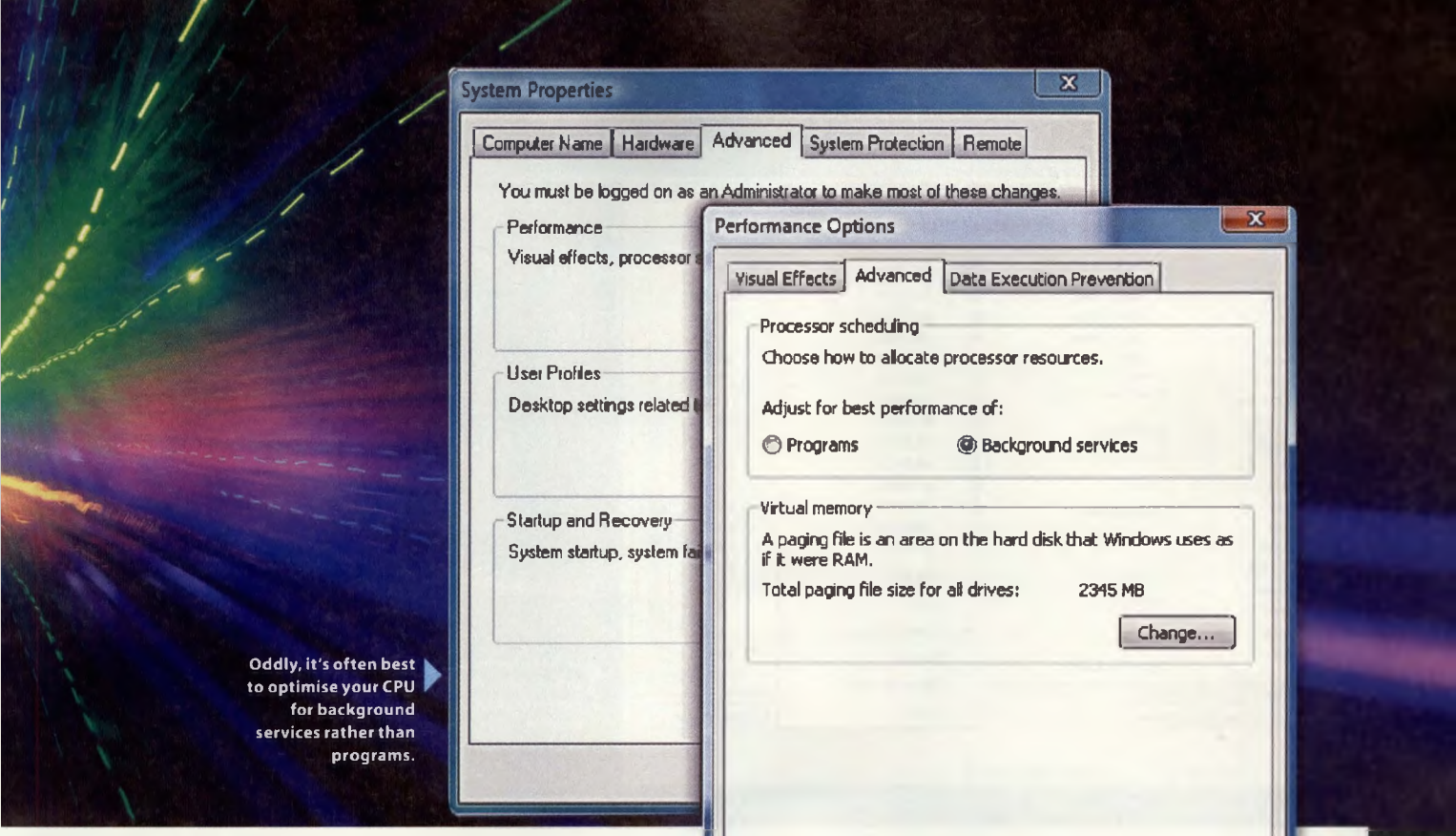
Run REGEDIT, go to 'HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\i8042prt\Parameters', create a DWORD value called CrashOnCtrlScroll and set it to 1. Reboot your computer. The next time your PC hangs, hold down the right Ctrl key and press Scroll Lock twice. You'll force a system crash, hopefully creating a crash dump file that can be analysed in the debugger. The '!analyze -v' command will point to the 'i8042prt.sys' that caused the crash, and you can also try '!vm' to show memory information or '!analyze -v -hang' to look for blocked threads. (Delete CrashOnCtrlScroll when you're done to avoid accidental crashes later).

You might also enter '!process 0 0'. This lists all the processes that were running at the time of the crash. Does one look suspicious? It will have an eight-character hex ID following it. If this were '849d84b0' then you'd enter that in a new command – like the following example – to see how that process has been using your resources: '!process 849d84b0 7'.

If you've finished debugging one crash dump and want to look at another, don't just close the file window. You need to click 'Debug > Stop Debugging' before you can open another file. The debugger decodes your crash files with the aid of symbol files that it downloads from Microsoft. However, this slows up the process – and occasionally the downloads don't work at all. Download and install the symbols package for your version of Windows (found at *www.microsoft.com/whdc/DevTools/Debugging/symbolpkg.mspx*), click 'File > Symbol File Path' and replace the 'c:\symbols' part with your own installation path. This should make the debugging process faster.



Browse the debugger help file to find in-depth explanations of each command.



Oddly, it's often best to optimise your CPU for background services rather than programs.

each of which can be running a thread at any given time. There's no special rule for sharing out these extra CPUs, though: Windows looks at quantums and priorities just as normal, and there's nothing to stop a multi-threaded application tying up your processors all on its own.

You can do something about this by defining the CPU affinity for this process, as in the CPUs it will be allowed to run on. In Task Manager, click the Process tab, right-click the process, select 'Set Affinity' and clear all but one of the CPU boxes. On a dual-core processor, this means the process will now only run on one of your cores. Even if you leave it at a normal priority, the program still shouldn't grab all your CPU time, leaving you able to do other things.

It's also possible to launch a program with a given affinity setting, again thanks to the very useful 'start.exe' command, although you do have to calculate an affinity mask first. Essentially, the first core has a value of 1, the second 2, the third (if you've a quad-core system), 4, and the fourth, 8. Decide which cores you'd like the process to run on then add those values together to produce the affinity mask: just core 1 and it would be 1, cores 1 and 3 would be 5, and so on. Convert values over 9 to hex then specify them in your shortcut like this, replacing 'm' with your affinity mask: cmd.exe /c START AFFINITY m c:\path\app.exe.

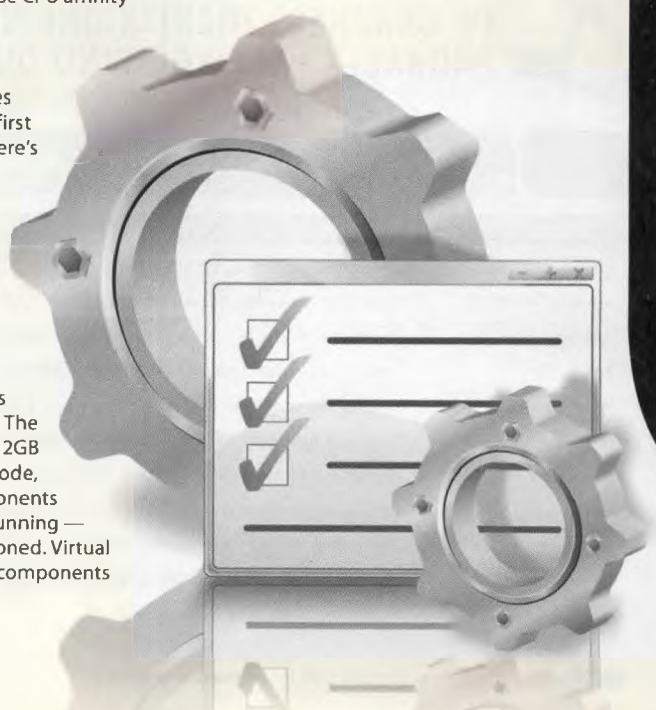
FACT FILE

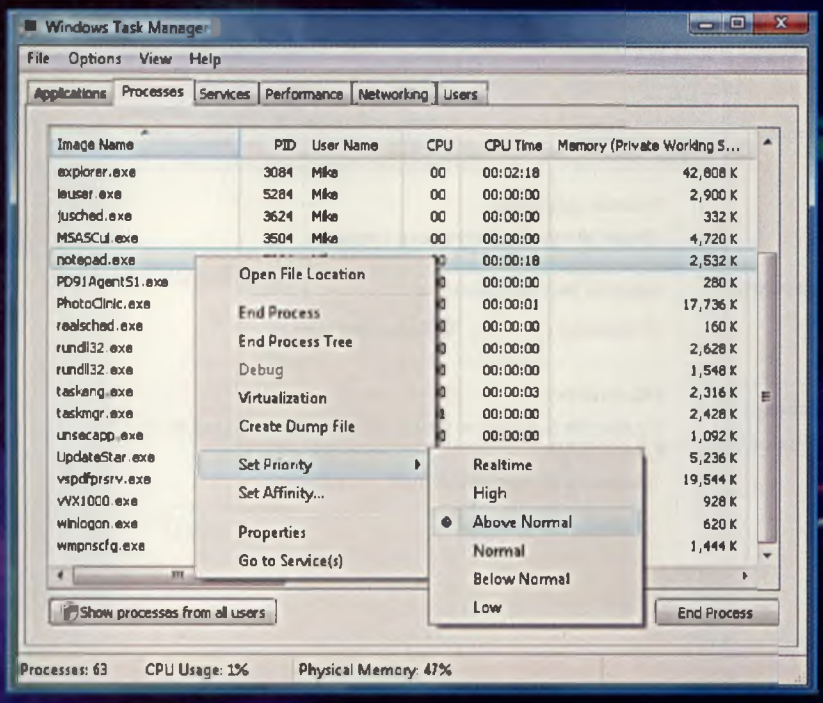
If your PC is crashing because Windows resources are drained, you might find a clue in the System Event log. Browse all of the recent errors and look for IDs like 2019 (non-paged pool is empty) or 2020 (paged pool is empty).

This is a useful technique to apply occasionally, if there's a specific program that you don't want to grab all your CPU time, but be careful. Generally, the less leeway you give to Windows own thread scheduler, the more inefficiently your PC will run. Just like priority boosting, it's best to use CPU affinity tweaks sparingly.

SYSTEM RESOURCES

Controlling how your processes access the CPU is an excellent first step in optimising a PC, but there's plenty more work to do. And learning something about the limitations of your system resources can be particularly useful, at least for 32-bit Windows users. (If you're using 64-bit Windows this next section won't apply to you, sorry.) 32-bit Windows allocates 2GB of virtual address space to each process you run. The Windows kernel also only gets 2GB to store everything — kernel code, drivers, DLLs and all the components it needs to keep your system running — so all resources are strictly rationed. Virtual memory allocations by kernel components like DLLs are taken from something called the 'paged pool' and on a 2GB Windows XP PC that defaults to a maximum of 360MB in size. Drivers often require memory that is guaranteed never to be paged to disk and that's taken from the 'non-paged pool' (which defaults to a maximum





Tweaking the priority of a process can deliver a small performance boost, but be careful — it can cause problems, too.

262MB on a 2GB XP PC). Windows XP doesn't let these pools grow to meet demand, so if a buggy driver grabs all the pool memory, odd things begin to happen: error messages, network failures, hangs and more.

Windows XP users can make the situation even worse if their PCs have 4GB of RAM and they use the '/3GB' switch to try and give applications access to more memory (see **http://support.microsoft.com/kb/833721** for more information). This squeezes Windows' own address space down to a mere 1GB, making resources drop still further. The maximum non-paged pool falls from 285 to 154MB and system page table entries (a resource used to map virtual to physical memory, see **www.tinyurl.com/6j5wmg**) plummets from 106,000 to around 15,000. If you've used the '/3GB' switch and your PC is now unstable, that may be why. Remove it and see what happens.

32-bit Windows Vista improves on this situation in many ways. It can now dynamically allocate new memory if either pool needs it, so your system will keep running. Still, if you've a resource leak — a process that keeps grabbing objects and doesn't release them — then even Vista will run into problems eventually. That's why everyone can benefit from monitoring their PC's resource use.

TASK MANAGER

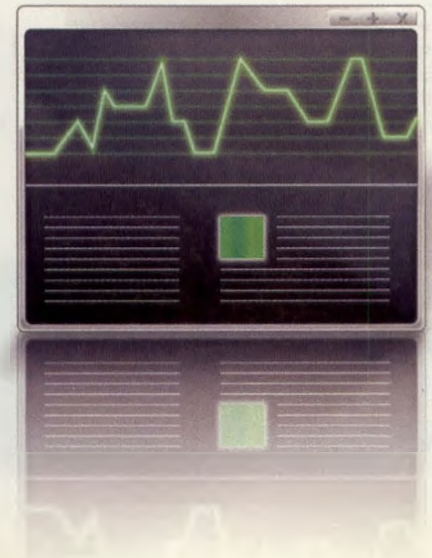
The simplest way to check your current Windows resources is through Task Manager. Press Ctrl+Shift+Esc to launch it, select the Processes tab, click 'View > Columns' and ensure the 'Memory — Paged Pool', 'Memory — Non-paged Pool', 'Handles', 'USER Objects' and 'GDI Objects' are checked. Reboot your PC and make a note of the highest value in each case, as well as the paged and non-paged totals displayed on the Performance tab.

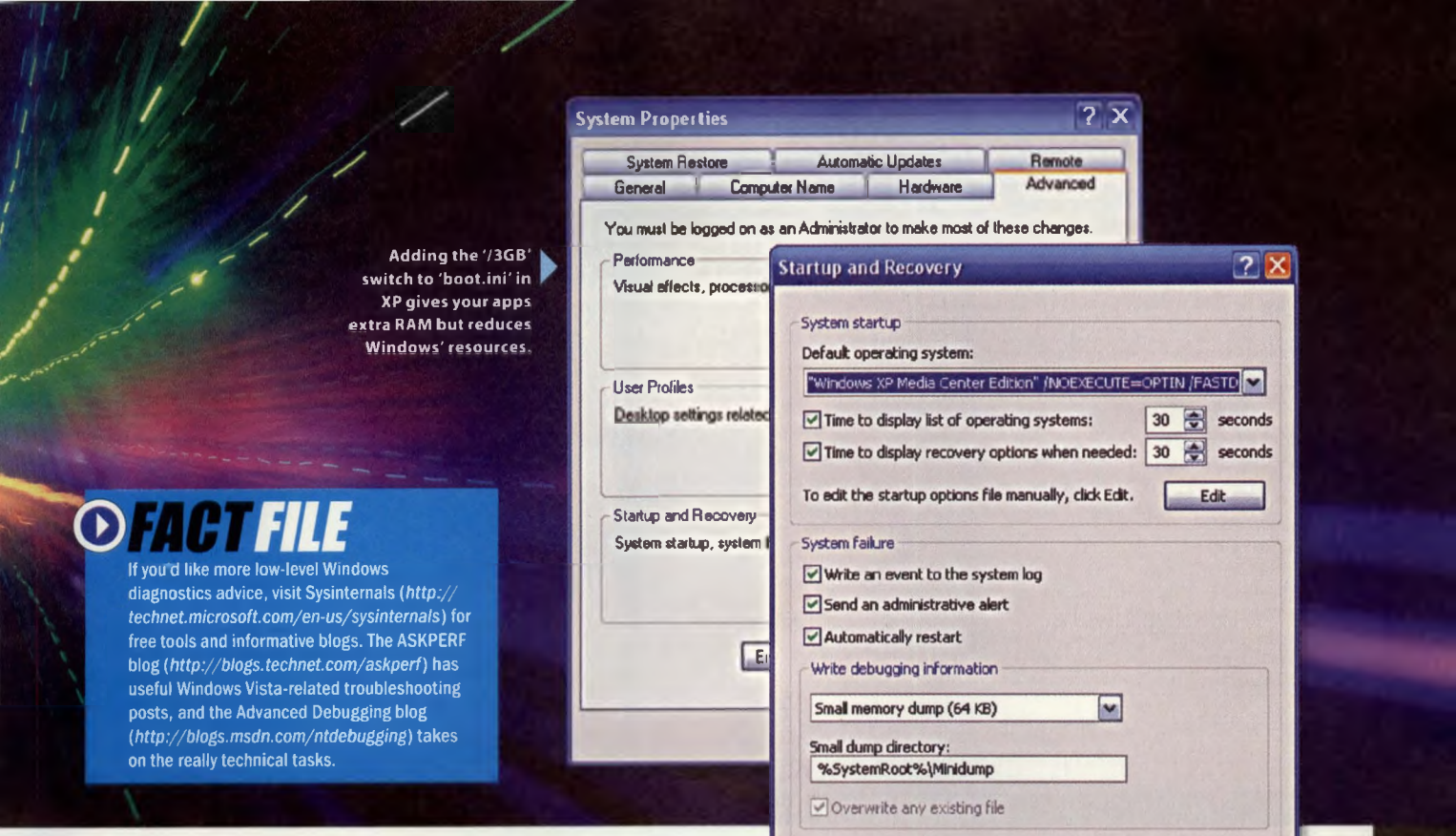
An hour or two later, take a look at Task Manager again. Anything using several thousands of handles, GDI or USER objects should be looked at closely, and Windows XP users should be concerned if non-paged pool use is over 200MB or paged pool allocations have passed 250MB. This may not mean buggy software — your application may simply be

IF YOU'RE REGULARLY GETTING COMPLETE PC CRASHES, THERE'S ONE SUITE THAT CAN PROBABLY HELP YOU FIND OUT WHY. . .

USEFUL WINDOWS DEBUGGER COMMANDS

COMMAND	FUNCTION
!analyze -v	Examines a crash dump file and tries to identify the cause
!analyze -v -hang	Looks for threads and processes that may have caused a system hang
!errlog	Displays any errors that never made the Event Viewer
lm kv	Display the drivers loaded when the crash occurred
lmvm module	Displays information about a module (try lmvm cdrom)
!poolused /t10 2	Shows major users of non-paged pool resources
!poolused /t10 4	Shows major users of paged pool resources
!process 0 0	Lists processes running when the crash occurred
!thread	Shows the thread running at crash time (may not be the cause)
!vm	Shows the use of virtual memory at crash time





Adding the '/3GB' switch to 'boot.ini' in XP gives your apps extra RAM but reduces Windows' resources.

FACT FILE

If you'd like more low-level Windows diagnostics advice, visit Sysinternals (*http://technet.microsoft.com/en-us/sysinternals*) for free tools and informative blogs. The ASKPERF blog (*http://blogs.technet.com/askperf*) has useful Windows Vista-related troubleshooting posts, and the Advanced Debugging blog (*http://blogs.msdn.com/ntdebugging*) takes on the really technical tasks.

doing a lot of work — but this can help point you in the right direction. Google the process name to find out more.

The Windows Performance Monitor can also help display this data, along with some other figures that Task Manager doesn't provide. Launch 'perfmon.exe', click the plus sign to graph a new value then open the Memory counters and choose 'Free System Page Table Entries'. If this is very low, perhaps 1,000 or less, then you may also have a resource leak somewhere.

So where is it? If you're regularly getting complete PC crashes — the 'blue screen of death' that kills Windows and forcibly reboots your system — then there's one suite that can probably help you find out why: the Windows Debugging Tools. Sure, they're aimed at developers, and they're complicated and packed with jargon, but they can also take a crash dump file and let you know whether resource problems were the cause. If they're not, then you can get some very helpful clues about the real culprit. And, despite their technical reputation, using the Debugging Tools at this level is very, very easy.

DEBUGGING TOOLS

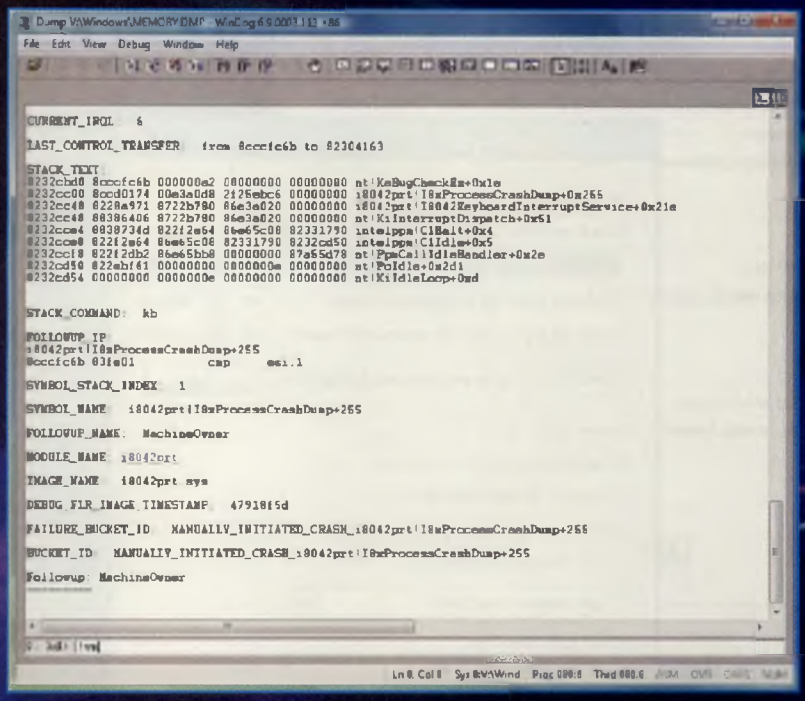
Start by downloading and installing the appropriate debugging package for your system (**http://tinyurl.com/cbk5c**).

You'll be using the debugger to diagnose memory crash files, so first you need to make sure that Windows is set up to create them. Right-click My Computer, select 'Properties > Advanced' and check the Startup and Recovery settings to ensure that 'Write debugging information' is set to 'Kernel memory dump' (unless you have good reason to do otherwise).

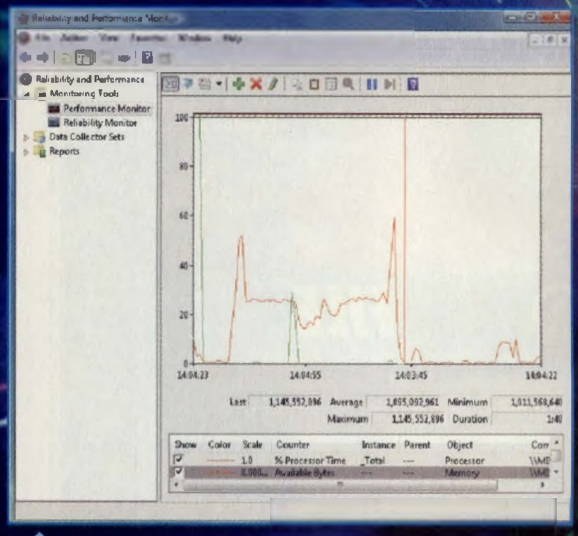
Click 'Start > All Programs > Debugging Tools for Windows' and launch WinDBG. (In Vista, make sure you right-click the WinDBG shortcut and select 'Run as Administrator'.) Click 'File > Open Crash Dump' and browse to your last crash dump file, perhaps '\Windows\Memory.dmp' or a file in the '\Windows\Minidmp' folder.

The debugger needs to download information from the web to help figure out the contents of your file, so be patient. You'll know when it's finished because an '0: kd>' prompt will appear in the bottom left-hand corner.

You should then see some basic information about the error type; 'Access violation — code c0000005' or whatever, and perhaps a DLL name as well. It's all data that might be useful if you want to search for online references to the error later. However, there's better to come. Once the debugger is ready, click in the command window to the right of the 'kd>' prompt and type the command: '!vm'.



They're ugly and reliant on cryptic commands, but debuggers are still an invaluable way to diagnose mysterious Windows crashes.



The Performance Monitor (perfmon.exe) is an ideal tool for keeping an eye on memory and resource use.

After pressing Enter, you'll be able to see how your virtual memory was being used at the time of the crash, including details for resources like paged pool, non-paged pool and system PTEs. The maximum values are displayed too, so it's easy to spot whether or not there was a resource problem at the time of the crash.

What if the resources all look fine? No problem — just enter this command instead: '!analyze -v'.

The debugger will now look at the record of what was going on at the time of the crash and tell you which file it thinks is most likely to be responsible. This may take a while, but it pays to be patient: in our tests, the debugger regularly managed to produce useful information. In the most recent test that we performed, it explained that our Windows crashes were probably caused by 'pctfw2.sys'. A quick visit to Google told us that the file was connected to the PC Tools Firewall and updating the program successfully solved the problem.

Of course, the debugger isn't right all of the time. Sometimes the '!analyze' command displays no useful information at all — and on other occasions, it'll blame the wrong file entirely. Results pointing to 'ntoskrnl', 'win32k', 'hal', 'ntfs' and other core components are usually false alarms and you shouldn't take any verdict as guaranteed. And you absolutely must not explore other debug commands or options while you're doing anything important in other applications. You could easily crash your own PC.

Still, cautious debugging frequently produces invaluable troubleshooting results which you simply can't discover any other way and this means that it's definitely worth a try. So don't be intimidated by the apparent complexity of these developer-oriented tools and techniques. Learning just a few low-level Windows details really can deliver positive results for everyone.

FACT FILE

If you don't want to manage application priorities yourself, then Process Lasso (*www.bitsum.com/prolasso.php*) or Process Tamer (*www.donationcoder.com/Software/Mouser/proctamer*) could help. Both programs monitor your CPU for buggy CPU hogs, dropping their priority automatically so other apps keep running.

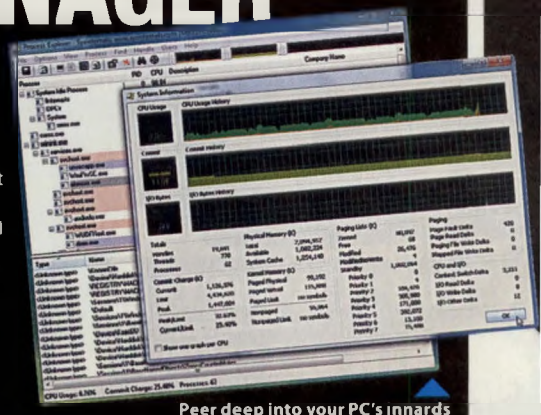
REPLACING TASK MANAGER

Process Explorer (*http://technet. microsoft.com/en-us/sys internals/bb896653.aspx*) is an excellent free Task Manager replacement, doing a similar job but with many extra features.

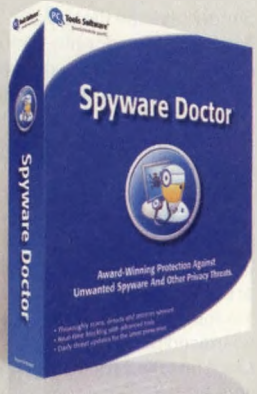
Click 'View > Lower Pane View > Handles', for instance, to see a list of all the files, Registry keys and other system objects that the currently selected process is accessing. It's very helpful if you are trying to figure out what a mystery program does. You can also use this program to resolve situations where you can't delete a file or replace a DLL because Windows says it's 'in use' — but by which program?

Type 'Find > Find Handle or DLL', enter part of the file name and Process Explorer will tell you. You can even right-click the file handle and select 'Close Handle' to free it up, though this should be a very last resort: it could crash the entire PC.

Double-click a process and you'll get in-depth details on its memory use, what its threads are up to and even a list of the process' open internet connections (handy if you're searching for spyware). Process Explorer is also one of the few programs that can display your paged pool and non-paged pool resource limits, though you'll probably need to install both the debugger and symbols package (see 'Ultimate debugging tricks') to get this to work. Click 'Options > Configure Symbols,' point the program at your 'Program Files\Debugging Tools for Windows (x86)\dbghelp.dll' file and symbols storage path, then click 'View > System Information'. If it works, you'll be able to see your paged and non-paged limits in the Kernel Memory section.



Peer deep into your PC's innards with the excellent Process Explorer.



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Gnome Art Next Gen allows you to easily browse and install theme elements from art.gnome.org.

Some of the various control, window and icon themes that come with Ubuntu.

LOOK AND FEEL

Installing Ubuntu is the first step, but discovering Linux doesn't end there. This month, *Ashton Mills* looks at ways of customising your system.

Last issue we covered a basic tour of the interface, selecting sources for package updates, installing new applications and enabling 3D accelerated drivers. This month we'll take a look at tailoring the look and feel of your desktop with themes, fonts and the environment itself.

THEMING UBUNTU

The default Ubuntu desktop theme has become iconic, and while it's quite pleasant you can certainly play with the styles that accompany the distribution or, going further, install entirely new themes.

A very simple change to give the interface a snazzier look using the theme components bundled in the distribution is as follows:

Click System > Preferences > Appearance. Under the Theme tab, click Customize. Under the Controls tab, select Human-Murrine. Under the Icons tab, select Tangerine. Click Close.

This is just one example of subtle changes you can make. You'll see a whole range of other theme styles available and, of course, you can install new themes downloaded from the web. In fact, the Synaptic package manager already includes a good selection for you to choose from.

If you run System > Administration > Synaptic and enter 'gnome-icon-theme' or 'gtk2-engines' into the search field you'll get a range of icon and control themes respectively to choose from. Once installed you can browse them from the Appearance dialog and then uninstall those you don't want to keep. If you type in 'gnome-themes-extras' you'll also get a range of excellent icon themes.

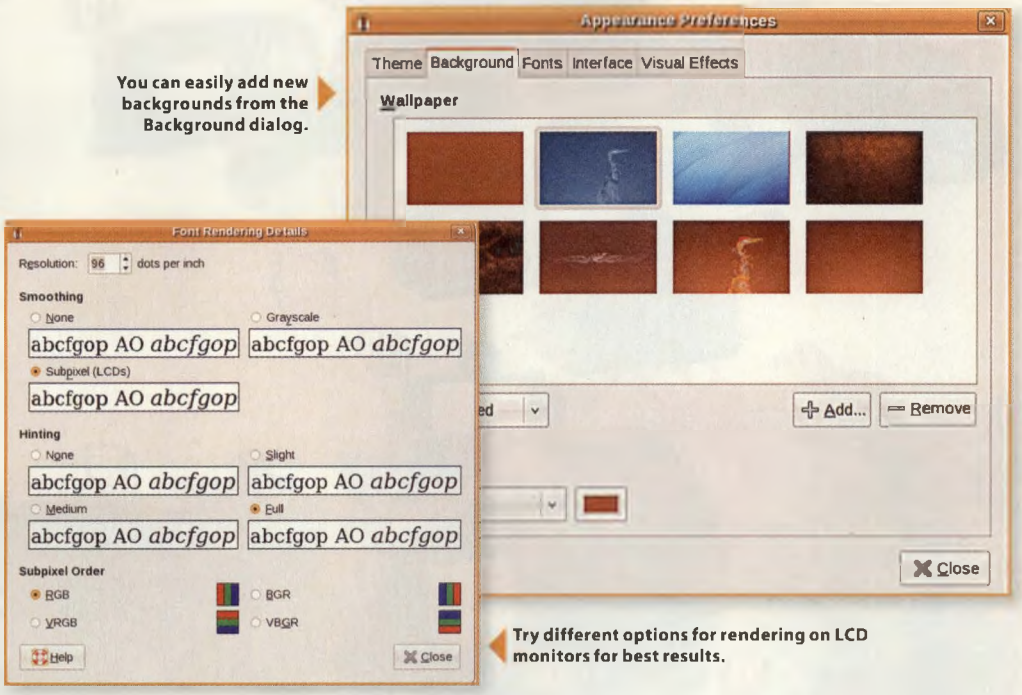
If you're looking for more than this, head to **www.gnome-look.org** and **http://art.gnome.org**, both of which showcase hundreds of window styles, icons, wallpapers, splash screens and more. You can download various components to use on your desktop (use the Install button under the Themes tab) or, if you're feeling brave but would like to try a friendlier method, play around with the new and still-in-development Gnome art manager called, not surprisingly, Gnome Art Next Gen. This program allows you to easily browse and install the contents of theme elements from **art.gnome.org** from an all-in-one application.

The package for Gnome Art Next Gen isn't in Ubuntu's repositories, so this is a good example to expand on installing new programs that we covered last month.

To install Gnome Art Next Gen first surf to the official download site at **http://developer.berlios.de/projects/gnomeartng**. As the program is still in development it's currently hosted on the **developer.berlios.de** site, which resembles SourceForce. Under 'Latest file releases' click on the Download link that corresponds to 'Packages' and then, from the file download screen, click on the file name for the .deb package to download — at the time of writing this is 'gnomeartng-0.6.0.all.deb'.

Simply save the file to your desktop, and then double-click on it. Ubuntu will launch the gdebi package installer which will show you details about the package and then, to install it, just click 'Install package'. Unlike installing programs under Windows, which all seem to come with their own installers that all operate differently, in Ubuntu the installer is part of the operating system and all programs are distributed in a standardised package format.

Once installed you'll find Gnome Art Next Gen in Applications > System tools. The



You can easily add new backgrounds from the Background dialog.

Try different options for rendering on LCD monitors for best results.

THE DEFAULT FONTS IN UBUNTU ARE GOOD, BUT VARIETY IS THE SPICE OF LIFE

first time you run it, available themes elements will be downloaded as you click on the various sections for backgrounds, window decorations, icons and so on. Keep in mind this is a bandwidth-intensive task, so you'll need broadband if you intend to use Gnome Art Next Gen to fully explore the **art.gnome.org site**.

FONTS AND RENDERING

The default fonts in Ubuntu are good, but variety is the spice of life, so if you feel like a change you can also change system-wide fonts from the Font tab of the Appearance dialog. But what if you want to install new fonts? As Linux makes use of TrueType fonts you can install under Ubuntu any font you can install under Windows, so if you find any you like — or even want to use the Windows ones themselves from your Windows partition — you can do so.

Alternatively, Synaptic also includes in its package lists a range of extra fonts as well. By way of example, try installing the following fonts:

Click System > Administration > Synaptic Package Manager. Click search and enter 'font'. Scroll down and select to install 'ttf-liberation' and 'msttcorefonts'. Hit Apply.

The new fonts will appear in the Font dialog of your Appearance settings. The 'mstcorefonts' package includes popular Windows fonts like Arial, Times New Roman, and Verdana.

When changing fonts if you ever want to revert to the original Ubuntu fonts select the defaults of 'Sans' from the list. This is actually a pointer to the Bitstream Vera Sans font, a popular choice for Linux distributions, which you'll also find in the list.

To a lesser degree, but still important if you have an LCD monitor, you can also tweak the way fonts are rendered on screen. Under the same Font tab in the Appearance dialog you'll see a section at the bottom called 'Rendering' with four key options. By default you'll likely have 'Subpixel smoothing' enabled, but you can play with this.

Click 'Details...' and you'll be presented with Smoothing, Hinting, and Subpixel order options. Generally having Subpixel and Full enabled for Smoothing and Hinting respectively should produce good results, however some LCD monitors provide a clearer display using Slight for Hinting — try it out and see if fonts look better for you. Each of the options changes all fonts on screen instantly, so play around and use the combination of Smoothing and Hinting that looks best to you.

When you're happy with this you can also play around with Subpixel Order, though usually the default RGB works consistently across all LCD monitors.

HANDY HINT

Linux is by design a modular system — from the basic tools to full-blown applications, it's this modularity that allows Linux to be tailored for everything from an embedded phone OS to running a server farm. And that modularity extends to the desktop, too.

What you see on your desktop is driven by two key components: the X Window System, and the Gnome desktop environment. The X Window System, or X for short, is the interface to your graphics hardware and is responsible for rendering the windows and other rendered elements. Gnome, on the other hand. sits on top of X and is responsible for *how* the windows (and the desktop) look and operate.

But Gnome isn't the only desktop environment you can run, there are dozens available — two of the more popular ones being KDE and XFCE.

These both offer alternative looks, features and even applications to Gnome. However. again with modularity as a strength, programs designed for KDE can still run on Gnome and vice-versa.

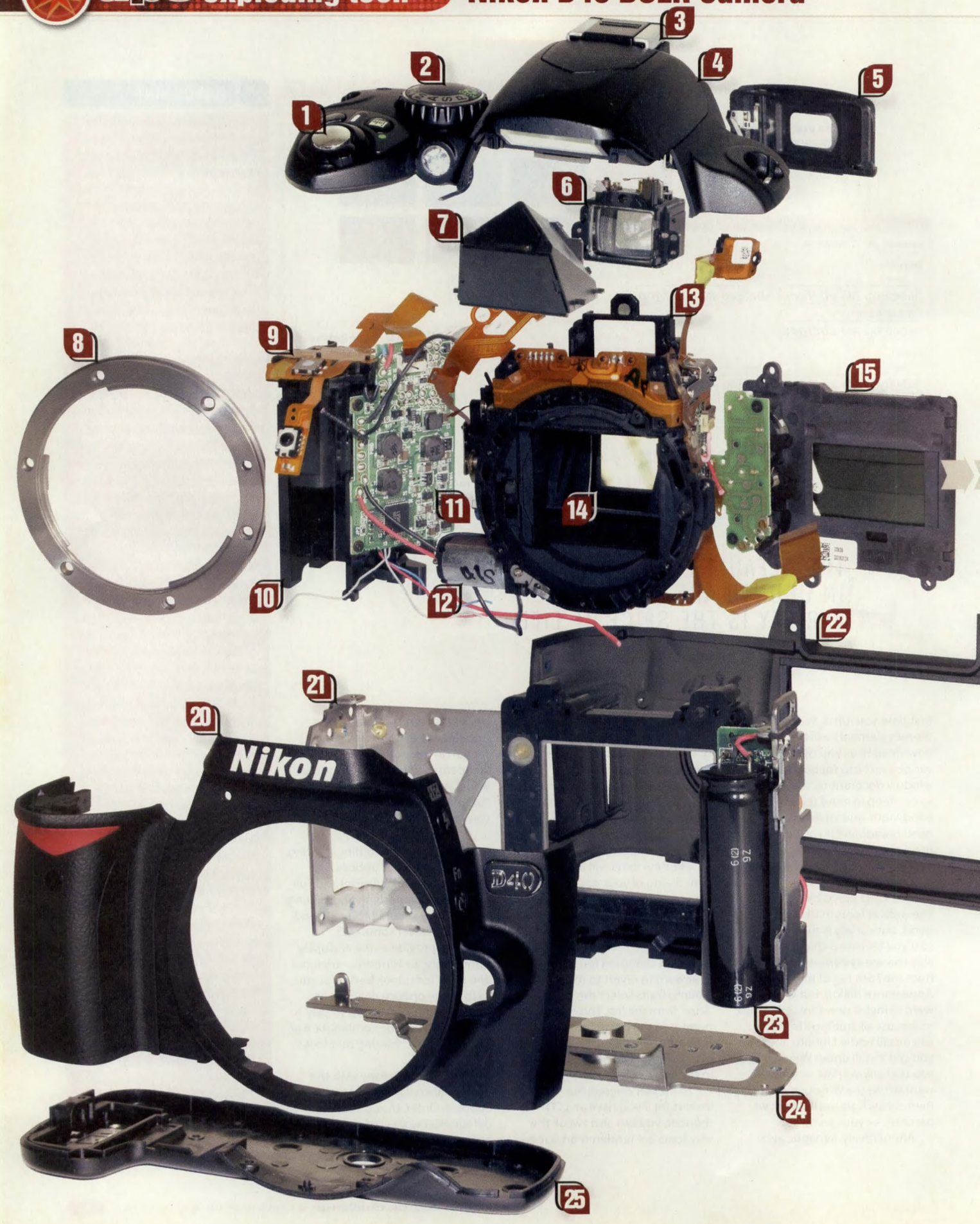
If you wish try out KDE or XFCE as a main desktop, you can either install complete KDE and XFCE packaged versions of Ubuntu — see Kubuntu (*www.kubuntu.org*) and Xubuntu (*www.xubuntu.org*) respectively — or install them into your current Ubuntu boot like so:

Start Synaptic. For KDE search on 'kubuntu', for Xubuntu use 'xubuntu'. Select to install 'kubuntu-desktop' or 'xubuntu-desktop' respectively. Click Apply.

Note: as these are complete desktops there will be a *lot* of extra files to install — 750MB for KDE and 250MB for Xubuntu — so be sure you're happy to use this much disk space first.

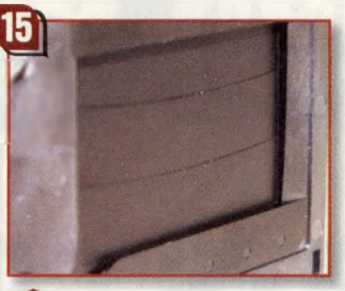
To explore them log out and before you log in click Options > Select session, and choose one. Ideally it's a good idea to create a new user account so you can explore a new desktop environment without impacting your current one. Briefly, to do this (as we'll cover this topic in a coming issue), click System > Administration > Users and groups and add a user there.

Nikon D40 DSLR camera



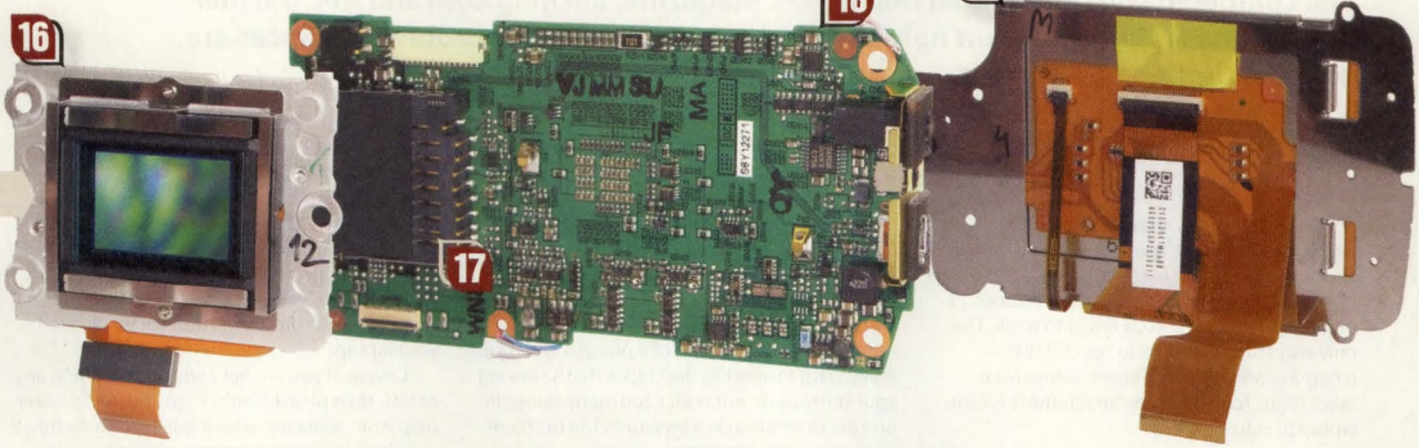
The prism is simply a series of mirrors positioned to behave the same way as an inbuilt persicope, allowing the user to see past the shutter and other camera internals (and out through the lens).

The D40's Pentaprism design viewfinder provides a wealth of information to the user through LCD displays (and is also adjustable).



Acting like shutters on a window (hence the name) by opening and closing at varying speeds, the shutter is what actually controls the exposure time of the CCD sensor, which is located directly behind it.

This 6MP CCD sensor is the guts of the camera. This is what has replaced film as the means of recording the incoming light to create your images.



This month, we explode Nikon's big-selling (and smallest) DSLR, the D40, to see what's inside and how they get it all to fit.

1. Shutter Release button with on/off switch
2. Mode selection dial
3. Flash Hot-Shoe Adaptor
4. Pop-up Flash
5. Viewfinder eye-piece
6. Viewfinder optics with dioptric correction.
7. Prism for directing the user's view down and through the body and lens
8. Metal lens mount
9. Release switch circuit.
10. Lithium Battery bay
11. Power circuit
12. Drive motor for reflex mirror and shutter
13. Viewfinder mount
14. Reflex Mirror
15. Shutter
16. CCD Sensor
17. SD card slot attached to the main board
18. Digital processing circuits (DG PCB)
19. LCD display and rear button plate
20. D40 front body panel
21. D40 support frame
22. D40 rear body panel
23. Flash charge holder
24. D40 frame base with tripod mount
25. D40 body base panel with battery bay door

ask apc

ASK THE *APC* TRIBE FOR IT HELP AND ADVICE

HARDWARE | WINDOWS | SECURITY | LINUX

EXPERTS SOLVE YOUR COMPUTING PROBLEMS

The combined staff and readership of *APC* Magazine, apcmag.com and *APC* partner publications is like one giant helpdesk! If you have a technical problem, chances are one of us knows how to fix it.

HARDWARE

AN EXTREMELY SLOW STARTER

Q A few months after I bought my Dell Inspiron 6400 laptop. It's got a problem which persists until now: most times I try to turn on my XP-powered machine, it takes about 15 minutes to start up and be ready to work. The only way to hurry it up is to turn off the computer and turn on it again. Generally it takes three, four, five or more attempts for the laptop to start properly.

Alex

A When you do successfully boot up, do the following: check System and Application Logs and look for anything odd that may have occurred (right-click My Computer > Manage > Event Viewer). The cause of your issue may be identified here and, if so, will guide your subsequent actions.

Grab CCleaner, it's free from **www.ccleaner.com**. Install it and click 'Cleaner' to get rid of temp files. Then click 'Registry' to tidy up registry inconsistencies, making sure you take a backup of the registry beforehand. CCleaner will prompt you before making any changes. You can substitute CCleaner for other remedial registry programs such as Registry Mechanic or RegCure.

Do the MSCONFIG thing (Start > Run> MSCONFIG > Startup) and basically untick any startup items you are not familiar with. Use Google to help identify what the startup item is if in doubt. Any changes to MSCONFIG will require a reboot. It's a bit of a process, but if you really want to identify the culprit that's slowing your startups do not untick too many things in one go. Untick one at a time until the problem goes away (if it does go away). When you find out what item caused the issue, you can then uninstall that application and then reset (tick) other items you had previously unticked.

You can also try Start > Run > CMD. Then type in 'SFC /Scannow' (must be logged in as an administrator). Have your original OEM OS disk handy. In the event system files have been altered this will revert any OS files back to their original pristine state. Just check how full your system disk is. Right-click on C: > Properties > Tools > Defragment now. If your disk is full or badly fragmented it will generally slow down your PC. If you have another system and you are comfortable with a 'day surgery' procedure, then whip out your laptop HDD. Attach it to another system using a USB 2.0 to IDE/SATA cable (available from Anyware Computing) or if you have a SATA HDD in your laptop, a Unitek SATA HDD Docking Station (available from uMart). Scan your laptop HDD with a decent virus scanner. Nuke your page and swap files and defrag the disk. Re-install the HDD back into your laptop.

Caveat: if you are not comfortable doing any of this, then please don't — go and ask for some help from someone who is qualified to do this. If your laptop is under warranty, then don't do anything that might upset your warranty.

The Peanut Gallery (apcmag.com/forums)

HARDWARE

MOTHERBOARD DRIVER PROBLEMS

Q I have just rebuilt my PC (new SATA drives, DVD drives, 2GB RAM and Gigabyte GA-945GCMS2L mobo). I installed a full version of Vista Home Premium then I tried to load the motherboard drivers from the CD supplied with the board. When trying to run the CD I get the message: "unsuitable for Win 98 or ME." I can

TIP... INTERNET

ADVANCED GOOGLE SEARCH TIPS

Google has a handful of lesser-known commands which you can use to search more specifically through its gigantic index. For instance, if you want to find all references to Vista on the APC web site, go to Google and enter this into the search box: 'site:apcmag.com vista' (note that there's no space between the 'site:' part and your chosen URL). Now your search results will be confined to the APC site. If a web site is down, but you still want to get access to a page, you can choose to immediately access Google's cached version using: 'cache:apcmagpro.com'.

Another useful Google feature is the 'allinurl:' operator. This restricts your search results to page names containing the words that follow this operator. For instance, say you want to find web pages that are expressly about cafes in Auckland, you'd enter: 'allinurl:auckland cafes'.

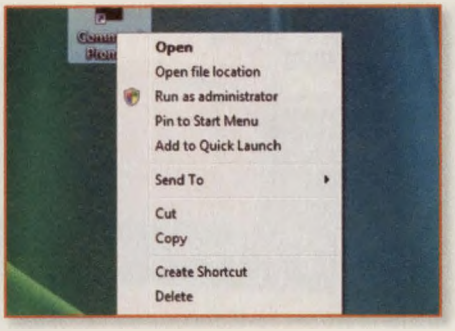
Advanced Google: knowing a few extra tricks for Google searching can help you find info quickly.

TIP... WINDOWS VISTA

CREATE A COMMAND PROMPT WITH ADMINISTRATOR PRIVILEGES

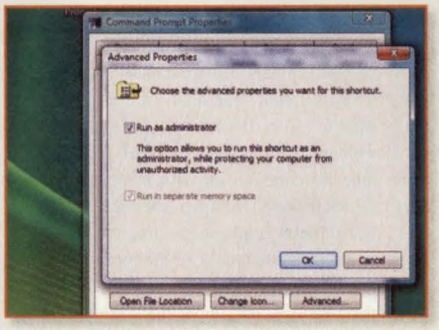
CREATE A SHORTCUT

At the Start menu, type 'CMD' into the search field. A list of different command icons will appear. Right-click and drag one of these icons from the start menu to anywhere on the Vista desktop. Release the button and choose the option to 'create shortcuts here' from the context menu that appears. Accept any challenges from the Vista UAC that may appear.



ADMINISTRATIVE PRIVILEGES

The command prompt does not yet have administrative privileges. This means that commands executed from this prompt will not run as if from an administrator. Without this ability certain functionality, such as Registry editing, will not be available. The icon needs to have administrative privileges granted. Right-click over the shortcut and choose Properties from the context menu.



GRANTING PRIVILEGES

The Properties menu contains several tabs, including menus for security, font, and layout. Admin privileges are granted through the Shortcut tab. Click on the Advanced button to access the administrative permissions. Place a check in 'Run As Administrator' and press 'OK' twice to return to the desktop. The newly-created command shortcut now will run with full administrative privileges.

open the disc and see the files that are on it but cannot access them — at the moment I have re-installed XP Pro and the mobo disc loads just fine.

Paul Welter

A Sounds like you are using the wrong disc, this board usually came with two discs, one for XP and below and another for Vista. I'd suggest downloading the drivers directly from the Gigabyte web site as they will be the most up to date: **http://tinyurl.com/6h4km5**.

Steve Doherty (apcmag.com/forums)

HARDWARE

CORRUPTED HARD DRIVE

Q I was using Partition Magic 8.0 to convert a drive from NTSC to FAT32. At the end of the process, a message popped up saying there was an error during the process. The drive now shows up, but as an unformatted drive. I've been told that the partition tables are corrupted. How can I recover the data from this drive?

Chris Scheib

A You are most definitely circling the drain with your data! If the partition table has been corrupted your data is most likely not gone but the disk can no longer find where it has put the data. Think along the lines of a reference book without an index.

There are still a couple of things you might like to try, but a note of caution: depending on what options you choose and what you have already done to your drive after you ran Partition Magic a failed attempt to retrieve data may make things worse (ie. send it all the way down the drain), but if you are at a stage of lost data with no backups, you possibly don't have anything to lose.

1. It is possible to manually reconstruct the partition table or else retrieve data from the drive in its current state. This is all achievable using open source tools available with most common Linux distros. However, this is pretty hardcore stuff and unless you are really familiar with how hard drives encode data at the hex level I wouldn't recommend trying it. But if you know anyone doing a computer science degree or undertaking forensic training they may be able to help!

2. There are a number of utilities that will retrieve files from damaged hard drives. One of the best I have seen and which operates at the very basic low level that you need is Spinrite, available online from **www.grc.com**. It costs about $80-90 and really does what it says. It's fairly straightforward to use: download and create a boot CD from the application and then boot your troubled PC with it. It will take some time to complete but has a very good success rate for these kinds of problems. Hope this helps. If you have backups of your data, that is your best bet. But if you don't, and you need your data, this may be a possible option for you.

Reaper (apcmag.com/forums)

A I've had previous success with a program called Active@ UNDELETE (**www.active-undelete.com**). It works well when you've just accidentally deleted files from your hard drive, but I'm not sure how well it fairs when a file-system conversion fails mid-process (it may not even work at all without a formatted drive). If all else fails, I would run a quick-format (make sure it's quick) in NTFS (or FAT32 depending how far along the conversion process was running) and then run Undelete — it may be able to salvage some files.

Mcbanjo (apcmag.com/forums)

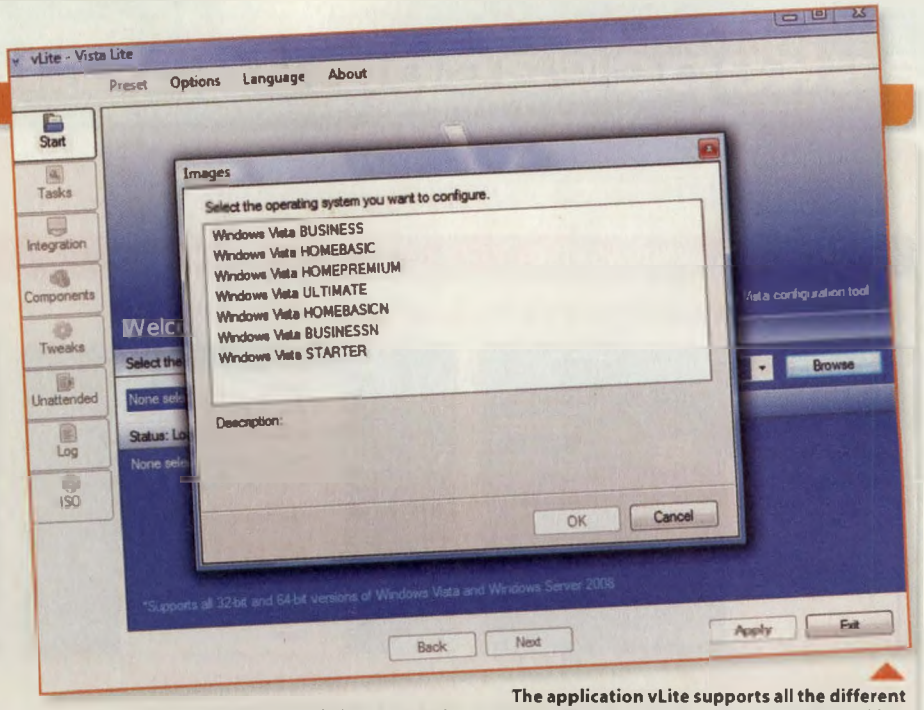
A If the data is worth the time to recover, try File Scavenger from **www.quetek.com**. It is the best I have used and you can download a demo to scan your drive for starters. The demo will at least tell you what can be recovered and what condition the files are in before you spend the money on the program (US$49).

Ross Peacock (apcmag.com/forums)

TIP... WINDOWS VISTA

INSTALLING VISTA SERVICE PACK 1

Vista SP1 has to be the most-awaited update in the history of Windows Service Packs. It's available for download and addresses a number of fundamental issues that have plagued Vista. However, it has also not been without its problems, so really, you need to take the same sort of precautions before installing it as we've talked about for Windows XP, such as creating a System Restore point or a disk image. As with XP, you can also create a new install disc with the service pack integrated. Again, you need a third-party tool. This time it's called vLite and you can download it from **www.vlite.net**. It works in essentially the same way as nLite, so download the Service Pack to your hard drive, copy your install files into a directory and use the program wizard to combine the files and create a new bootable install disc. Incidentally, vLite can also be used to create a customised Vista install, removing any unnecessary components so Vista uses less drive space and places less of a strain on your system.



The application vLite supports all the different versions of Vista and enables you to add Vista Service Pack 1 to your install files.

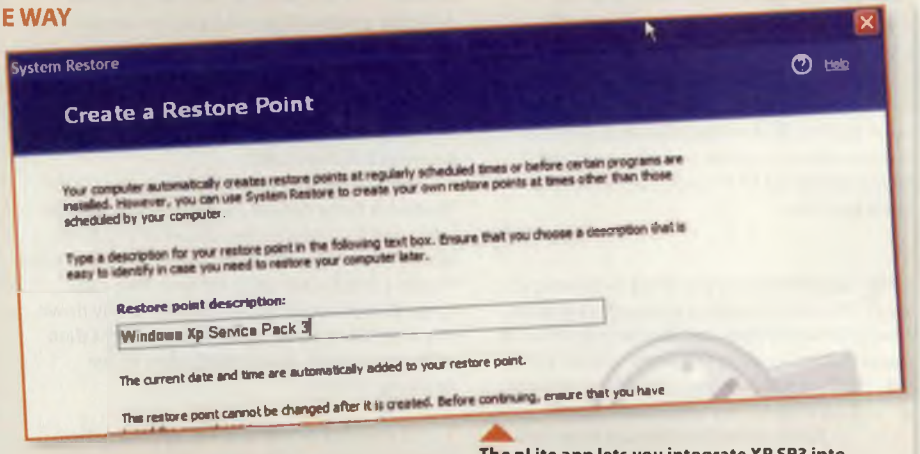
TIP... WINDOWS XP

INSTALL XP SERVICE PACK 3 THE SAFE WAY

We've had to wait a long time for Service Pack 3 for Windows XP, but before you dive headlong into installing it, there are some things you need to be aware of. One of the reasons that XP3 has been so delayed is that testers have run into a host of problems, from endless reboots to blue screens. As XP3 adds no new features and is simply a series of updates that you should already have, there's no need to rush into installing it. Instead, we recommend you take your time, make a backup or even slipstream the service pack into your Windows install disc, and do a fresh, clean install of XP.

The first thing to do is to download Service Pack 3. You can download the 316MB file from *www.tinyurl.com/4qvth5*, or alternatively you can use the Microsoft Update site, *www.update.microsoft.com*. Before you start the install though, you should take the time to back up your data – and although the Service Pack should create a System Restore point during the install, we recommend that you set one yourself manually, just for good measure.

Although System Restore is a good safety net should things go wrong, we actually prefer a different method of backing up: disk imaging. Our preferred application is Acronis TruImage, but any disk cloning or imaging tool will do. By creating a disk image, you have an exact copy of your Windows partition, which is somewhat easier than creating a restore point and then backing up all your data separately. Should things subsequently not go to plan, you can simply restore your image and return your PC to its previous state.



The nLite app lets you integrate XP SP3 into your Windows install files and then create a new install disc.

INTEGRATING SP3

While backing up your system and then installing SP3 is one way of installing the update, there is another method. Chances are your Windows XP install is getting quite long in the tooth now, and if you have a Windows Install CD (not a recovery CD), then you may as well re-install Windows, with SP3 integrated. One of the easiest ways to do this is to use a third-party application called nLite, which you can download from *www.nliteos.com*. You will need the network install version of SP3, the link for which we provided earlier. You will also need to copy the install folder from your original XP Install CD onto your hard drive, or if you have the install files on your hard drive in a specific directory, you can use those. Use nLite to combine the Service Pack files with your install files, create a new bootable CD and you can now install Windows with SP3 integrated. One of the major issues with SP3 has been endless reboots on some AMD-based PCs, specifically those built by HP. The problem appears to stem from the fact that the same disk image has been used for both Intel and AMD-based PCs and, when XP SP3 is applied, the wrong power management update is installed. To solve this problem, you can download a patch from *www.tinyurl.com/566adx*. Other problems have been caused by a variety of issues, so if you have a PC of this particular type we strongly recommend that you go for a clean install of Windows, rather than updating an existing install.

WINDOWS

WILL XP SUPPORT CONTINUE?

Q Does the release of XP SP3 mean that support will be extended?

Declan Perchance

A Microsoft admits that the takeup of Vista has not been as prompt as they expected. IT Managers remember the bad old days of migrating users from Windows 98 (where almost everything worked out of the box) to Windows XP (where seemingly nothing worked out of the box) and aren't keen to revisit those experiences.

Nevertheless, Vista is here to stay and it's almost inevitable that IT managers who plan to stick with Microsoft on the desktop will eventually have to roll out Windows Vista.

The release of Windows XP SP3 hasn't made this any clearer, but here's the story in a nutshell. Mainstream support for Windows XP will end in June next year.

Extended support will exist only for small-form factor laptop PCs such as those currently manufactured by ASUS. This is because Microsoft still has large markets in the developing world to service and by extending support for this area they can provide a way in which developing markets can get a foot on the upgrade ladder.

Windows XP SP3 is simply a rollup of all the previously published patches and provides few feature benefits.

It's intended to be a solution for XP owners who haven't been keeping up to date and solves a few problems which will appear when owners of unpatched machines attempt to access services such as Windows Updates and applications which require the installation of the .NET Framework.

HARDWARE

USB DRIVE WON'T OPEN

Q My USB drive won't open. I have a DSE 1 Gigabyte USB drive and I only got it this year. I need to access it so I can transfer items from one computer to an Eee PC.

Andrew

A I would first check to make sure the computer is not at fault, try other USB devices and test your USB on other computers. You say you cannot open the USB. If this means it is visible in Windows or whatever OS you are using, try reformatting the disk, and if this still doesn't work, for the amount of effort required to repair the faulty USB drive I would probably just go and buy another one, as they can be bought for around $10 and I have seen 1GB advertised for even less in various brochures.

If the problem lies with your computer, make sure the USB ports are connected to your motherboard and switched on in the BIOS (the USB was switched off in the BIOS spontaneously in an old notebook I had). You could also try a PCI or PCMCIA add on card to add USB ports and get around faulty motherboard ports.

Kristian (apcmag.com/forums)

A If you are using Vista, you could be suffering from a known Vista problem, where the OS sometimes does not recognise new USB devices. This is a known issue with Windows Vista and is noted in the Microsoft Knowledge Base under article number 940199. Vista relies on information contained in a file called 'infcache.1' to provide it with a list of drivers and their locations in C:\windows\system32\drivers. This file can be overwritten, corrupted or even deleted by installer software. When this happens, Vista is sometimes unable to repair or recreate the file and so loses the ability to install new drivers for attached devices. The solution is to find and download the published hotfix. Incidentally, some web sites recommend deleting infcache.1 as a solution to driver incompatibility issues (usually as an escape when a poorly written driver has been installed). Never manually delete system files, but use the Add/Remove Programs feature to remove all traces of the driver. If this doesn't work, use the system restore feature to return to a point before the driver was installed.

HARDWARE

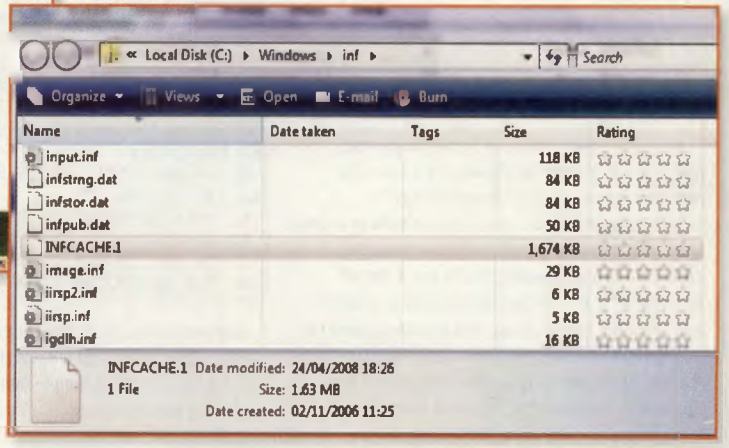
AUTOMATIC WINDOWS RESTARTS

Q My PC often restarts for no apparent reason, and Windows XP says it has recovered from a serious problem. Sometimes, when I shut Windows down, instead of my computer turning off, it will restart, going back into Windows and displaying the same message. What would cause this to happen?

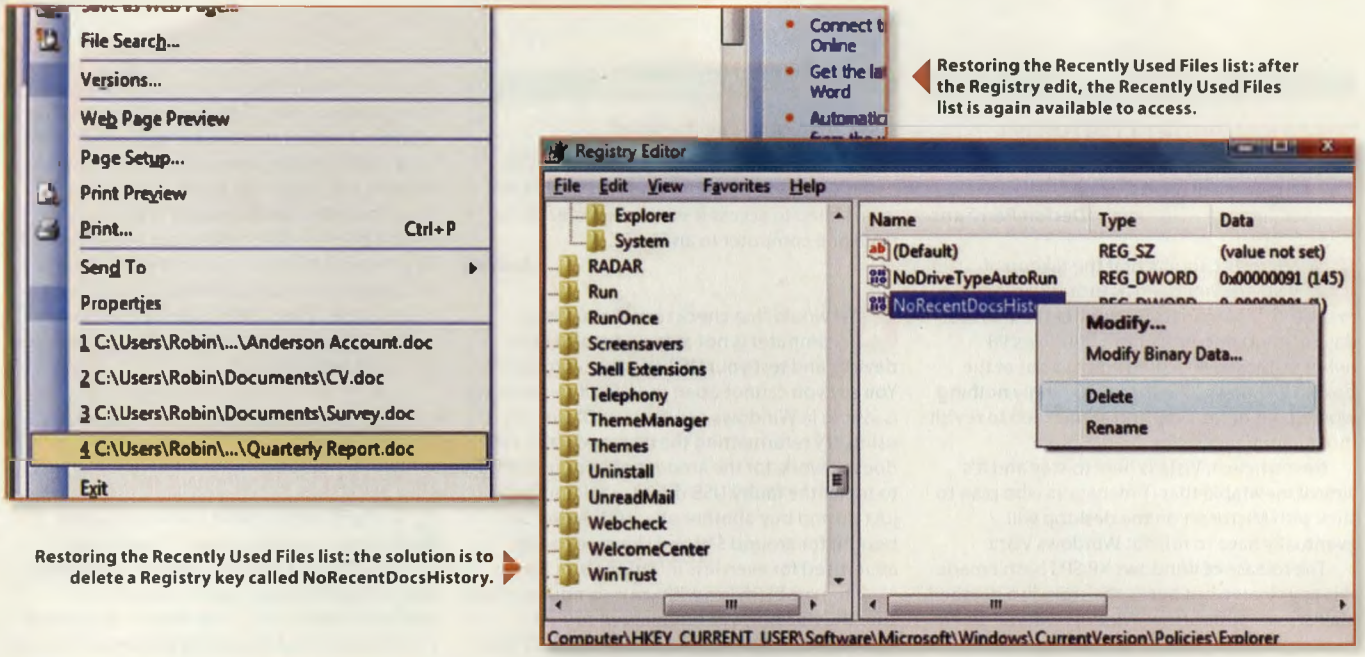
Derek Forsyth

A The most likely problem is that either an item of software you have installed or a faulty hardware driver is responsible. The app or driver is causing a crash, and because Windows is set by default to restart in the event of a problem, your PC just reboots. In some cases you may see a blue screen flash up before Windows reboots, but probably not. To stop this happening, right-click on My Computer, choose 'Properties' and click on the 'Advanced' tab. Under 'Startup and Recovery', click the 'Settings' button, and under the options for 'System Failure', untick the option to automatically restart. Next time it happens, you'll see a blue screen, with a description of the error.

Windows XP: mainstream support will end next June.



Vista may not recognise new USB devices: The file 'infcache.1' is vital for the smooth installation of new



Restoring the Recently Used Files list: after the Registry edit, the Recently Used Files list is again available to access.

Restoring the Recently Used Files list: the solution is to delete a Registry key called NoRecentDocsHistory.

OFFICE

RESTORING THE RECENTLY USED FILES LIST

Q After my son used my Vista PC, the Recently Used Files list disappeared from Microsoft Word. I've looked everywhere for an option to restore it, but I can't find one.

Darren Couts

A From what you describe, it's likely that the file list will also have disappeared from all your other MS Office programs. The reason for this problem is that one of your Registry entries appears to have been changed.

To restore this feature, you should click on 'Start > Run' and then enter 'regedit'. Now drill down to 'HKEY_CURRENT_USER > Software > Microsoft > Windows > CurrentVersion > Policies > Explorer' and look for an entry on the right-hand side for 'NoRecentDocsHistory'. Right-click this entry to delete it.

The next time that you open the affected programs, you should find that your Recently Used Files lists are back.

OFFICE

CUSTOMISE YOUR OUTLOOK ALERTS

Q Every time I get a new email, the desktop alert covers up my system tray. How can I make desktop alerts appear where I want them to?

Derek Obo

A Outlook desktop alerts can be customised, but the settings are hidden away inside Outlook preferences. From within Outlook go to 'Tools > Options > Preferences'. From Outlook preferences go to Email Options, then to Advanced Email Options and finally to Desktop Alert Settings. Within this dialog, you can choose how long to have the Desktop Alert show for and also set the Transparency for the Alert notification. Press 'Preview' to show the Desktop Alert dialog and drag the Alert dialog to wherever you wish on the screen. From now on, your Desktop Alert will appear in the new location. Alternatively, whenever a new Desktop Alert appears, click the small 'twistie' in the top right-hand corner of the box. From this menu, you can disable Desktop Alerts completely, or use the menu shortcut to go straight to the Desktop Alert settings.

NETWORKING

MESSAGING WITHOUT THE NET

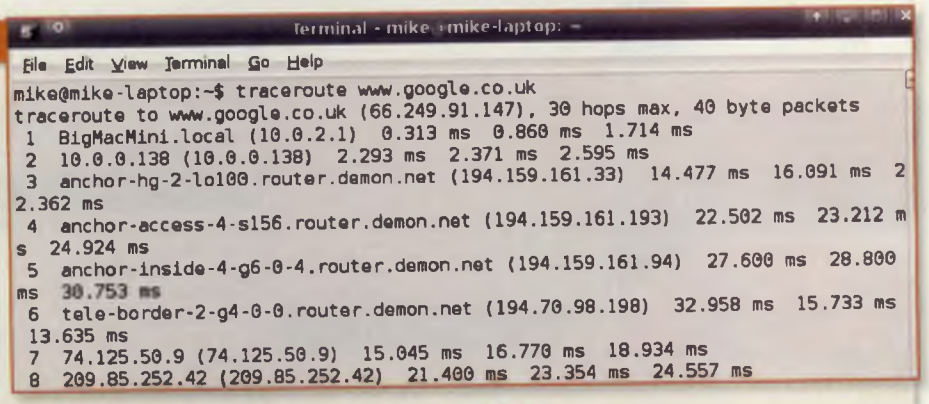
Q I would like to know if there is a program that I can install at my workplace for

TIP... NETWORKING

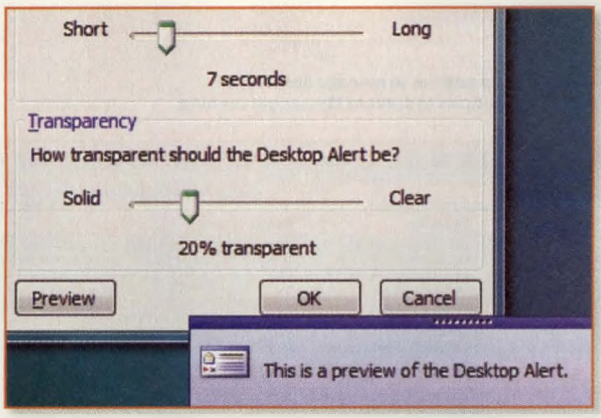
TRACING THE NETWORK ROUTE

If a PC appears to be inaccessible on your local network or the internet, you may be left scratching your head. Is it a fault on the remote PC, or another box along the route? That's where the very handy 'traceroute' utility comes in. It sends contact messages to remote machines and shows the path of network packets along the way.

To do this on Windows, open up a command prompt and enter: 'tracert google.com' (on Linux the command is 'traceroute'). You'll see a list of different PCs and routers between your machine and Google's server, along with the time taken for the contact message to reach each machine along the way. If you're trying to contact a server that appears to be down, the feedback messages will stop when they get to the server – but if they freeze before that point, you'll know that another machine along the way (for example, a network router) is causing all the trouble.



Tracing the network route: Traceroute in action, showing the computers between a Linux laptop a Mac mini router, and Google's servers.



Customise your Outlook alerts: Outlook Desktop Alerts can be moved so that they appear wherever you want them to.

internal messaging over the network. Sometimes the internet is down and instead of calling ten or more different people to ask/tell them the problem I would like a place where staff can send messages to PCs that other staff can check to see if there are any problems.

N Savic

A For the messaging query, assuming you're in a Windows workgroup, you can just use the 'net send' command. Here's a web site with some usage info: **www.amset.info/windows/netsend.asp**.

James Bannan (apcmag.com/forums)

A If you would like your own IRC server, then Join Me! from **http://joinme.sourceforge.net** could do the job. It's no longer supported, but works fine over a small network. Though, as the site suggests — it's not equipped for large scale usage.

Chris Weaver (apcmag.com/forums)

NETWORKING

USE LOCAL GROUP POLICIES TO MANAGE DESKTOPS

Q I lose productivity because my employees like to use Windows messenger to chat. Is there a way to disable Messenger?

Frank Wright

A Blocking Messenger traffic isn't a matter of stopping up one or two holes in a leaky firewall. Windows Messenger is equipped with effective mechanisms enabling it to traverse NAT-equipped devices, and one of the ways in which Messenger communicates is to use a dynamic (not server assigned) range of UDP ports along with communication over HTTP in order to establish the session. Thus, blocking one or more UDP ports will not work. Additionally, Messenger uses other port ranges for audio and visual communication (5004–65535), file transfer (6891-6900), whiteboard sharing (1503) and so on. The only sure way to prevent Messenger traffic may be to prevent communication in the first place by removing client access to port 80. Of course, this will also remove your HTTP traffic and so isn't usually a practical solution.

Another approach is to stop Messenger from running at the client. This can be achieved by removing the messenger application from the list of available programs. However, if your users have administrative access, there's little to stop them simply re-installing Messenger from any available source. One remaining trick that the network administrator can still employ is to use local group policies to prevent the program from running at all:

1. At the Start menu, choose the Run option and enter 'gpedit.msc'.
2. At the console find the following path; Computer Configuration/Administrative Templates /Windows Components/Windows Messenger.
3. Enable both Messenger policies.

NETWORKING

SECURE YOUR PC ON PUBLIC NETWORKS

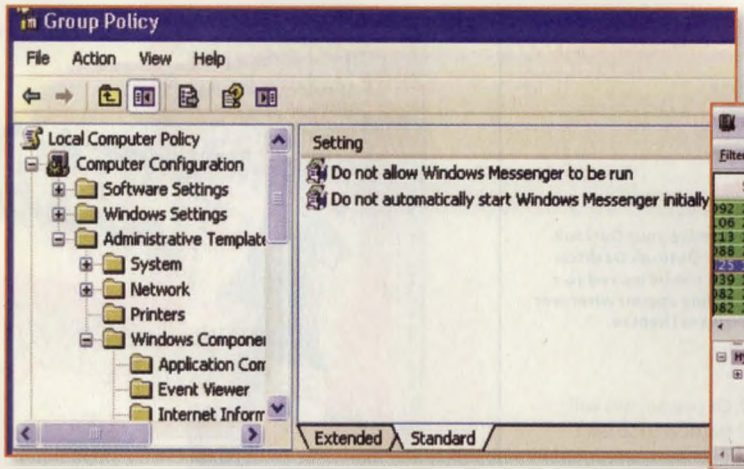
Q Just how secure is it when I use my laptop in an internet cafe or on some other public network?

Francis Pecha

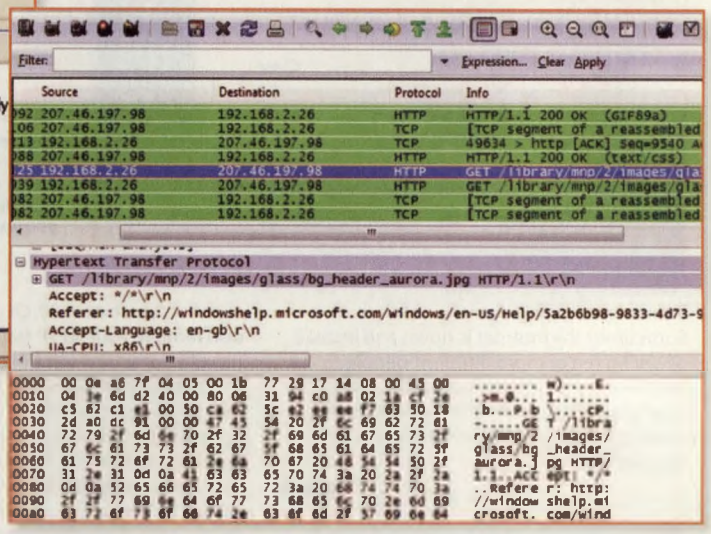
A Unfortunately, the answer is that it's not very secure at all. Easily available free software like Wireshark allows casual observers to analyse wireless data in real time from public hotspots. And criminals looking for profit have at their disposal a large number of tools which enable theft and fraud using your captured details.

Given enough time and resources, a determined thief can gain entry to your computer; but, like any thief, they will be looking for an easy target.

You should always use encrypted hotspots where available. Try to choose public hotspots which require you to have a token or key in order to connect. Entering a password to get through to a web browser isn't enough, because by that time, a connection has already been made to the network. Look for hotspots that require a password before



Use local group policies to manage desktops: enable local policies to prevent Messenger running.



Secure your PC on public networks: the unencrypted TCP/IP data used to connect your laptop to the network is readable as plain text.

allowing connection to the public network.

Configure your laptop PC to prompt you before connecting to a new network. In Windows XP, this requires a configuration change in 'Preferred Networks'.

Choose 'Access Point Only' to disable XP's default ability to automatically connect to ad hoc networks. In Vista, this behaviour was changed, and Vista will always prompt before connecting to any public network. Make sure that you always disable 'File and Printer sharing'. In Vista, this option can found in the 'Network and Sharing Centre'.

Avoid purchasing online when in a public place. Even if your connection is to a secure web server through a secure hotspot, the credit card you use will be in plain sight, along with the details that are displayed on the screen. If you really can't avoid this, use software such as Roboform (**www.roboform.com**) to automatically enter your details.

HARDWARE

XP WON'T RECOGNISE MORE THAN 128GB

Q Recently I bought a second hard disk of 160GB. I put it as master, but after the installation of XP Pro, it only shows 128GB. The system partition is FAT32, and the rest is in NTFS. Is this normal?

Ricky

A It looks like you're using an out of date copy of the Windows XP CD to install Windows on your computer. In order to see hard drives larger than 128GB, you'll need to install Windows from a CD that has Service Pack 2 or greater integrated into it.

You can use NLite to create a new CD from your old one that has the latest service pack integrated into it.

Simply go to **www.nliteos.com/** to download a copy.

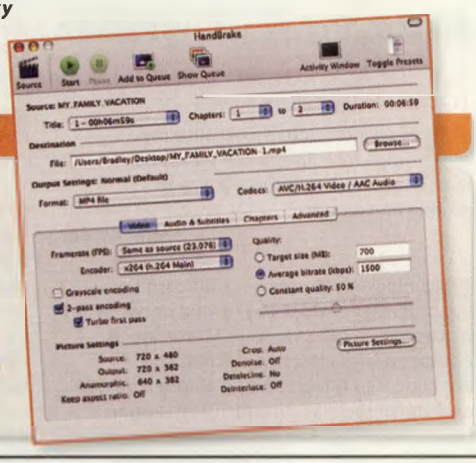
The NLite web site also has guides telling you how to integrate a Windows Service pack into your Windows CD.

Duncan Paul

TIP... MULTIMEDIA

WHO WANTS TO HAVE TO LUG AROUND A HEAVY SATCHEL OF FILMS?

HandBrake (*http://handbrake.fr*) is a supremely flexible tool for converting DVDs to a variety of different media formats, be it for your desktop PC or handheld media player. It comes with pre-set resolution and bit rate settings for various devices such as Sony PSPs and video-equipped iPods and is completely open source. Note that due to complications with software patents, HandBrake cannot be distributed in certain places in the world, so unfortunately we can't include it on the cover disc, and you'll need to obey copyright laws when using it.



Convert DVDs: HandBrake has it all: it's free, it's powerful, and it runs on Windows, Linux and Mac OS X.

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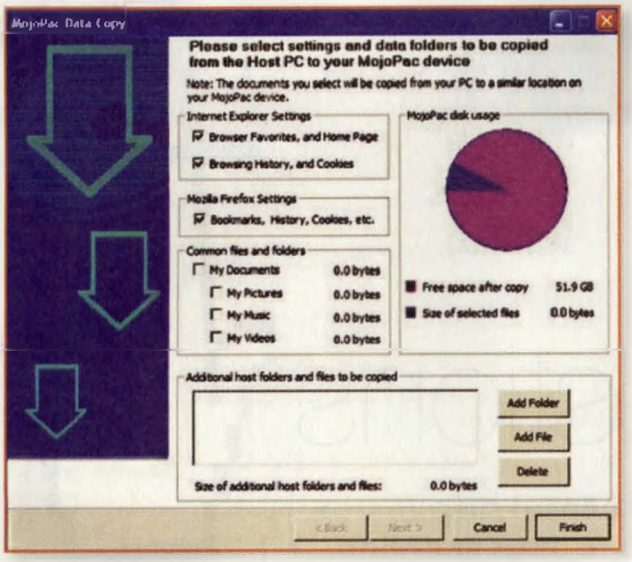
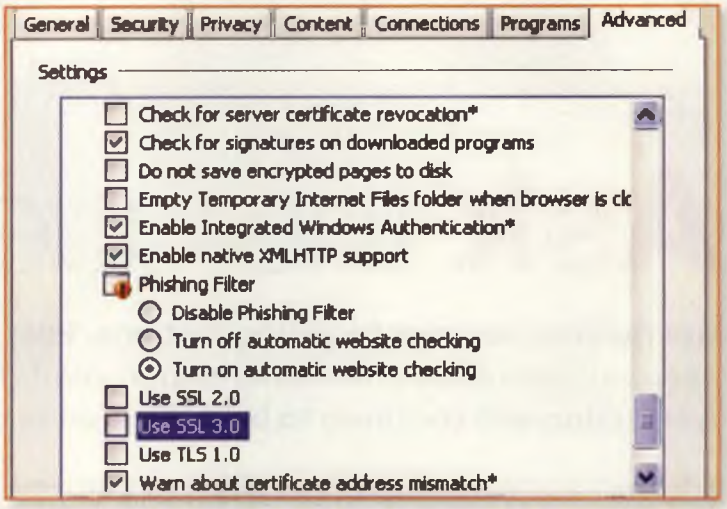


Portable Windows desktop: choose which options you want Mojopac to install onto your portable desktop just by clicking a few buttons.



Problems receiving Windows updates: SSL 3 needs to be enabled to receive Windows Updates.

WINDOWS

PORTABLE WINDOWS DESKTOP

Q I want to be able to take my Windows XP desktop settings — as well as some of my applications — with me if I am using a friend's computer. Is there any way that I can accomplish this and make my Windows desktop portable?

Gayle Dunning

A There are a number of toolkits available for creating a portable version of your desktop, most of which also let you install software to take with you. You mentioned that you were using Windows XP, and for this OS we recommend Mojopac (**www.mojopac.com**). Once the software is downloaded and installed onto your PC, you can connect a USB storage device and create a portable desktop on it that is very similar to a Windows XP Desktop. You can then install applications, as well as save files and folders onto the newly created C:\ drive. The larger the storage media, the more you will be able to install. Then, when you plug your USB device into your friend's computer, Mojopac will present you with your desktop, files and programs, while using the resources of the host computer. You can even toggle between the two desktops if you want to. No changes are made to any of the settings of the host machine — so when you're finished using it, simply close your portable desktop and remove your USB device.

INTERNET

WINDOWS UPDATE PROBLEMS

Q Following the installation of a new proxy server we now find ourselves unable to receive Windows Updates. What's happening?

Matt Gresham

A Windows Updates rely on a combination of secure technologies working in tandem to enable updates to flow through your network. In your case, the switch to an appliance server has caused this service to fail. Within Internet Explorer — on your client machines and on your Windows servers — ensure that either SSL 2 or SSL 3 has been enabled in Internet Explorer's advanced settings. Incidentally, successful SSL connections rely on client and server having the correct time set. If SSL fails, make sure that your clients are receiving NTP information. You also need to make sure your SSL certificates are installed correctly as follows:

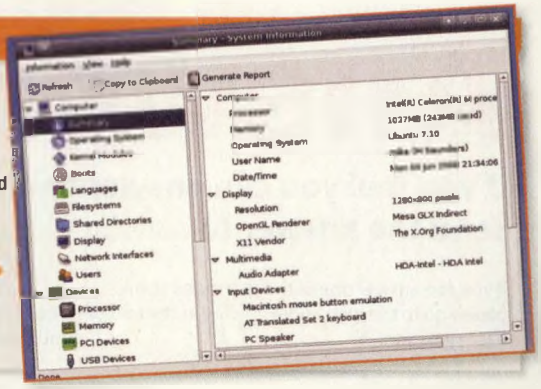
1. In IE choose 'Tools'> 'Internet Options'.
2. Choose 'Contents', 'Certificates and Trusted Root Certification Authorities'.
3. Find 'Microsoft Root Authority' and double-click to expand the list of certificates.
4. Find the 'General' tab and make sure that the 'Valid from' date is between 1/10/1997 and 12/31/2020.
5. Then find 'Certification Path'. Make sure that the 'Certificate Status' is 'OK'.
6. Within the 'General' tab, ensure the 'Valid from' date is between 5/11/1997 and 1/7/2004.
7. Within the 'Certification Path' find Certificate Status and ensure that the certificate is marked as 'OK' or 'Not yet expired'.

If secure traffic is not proxied through the server, it will fail. From within Internet Explorer's properties, find the LAN settings under the 'Communications' tab. Select proxy settings and type the DNS name or IP address of your proxy server.

TIP... LINUX

NO CONTROL PANEL? JUST INSTALL HARDINFO

There's no standard Control Panel-like interface for managing hardware and getting system information across Linux distributions. However, an excellent tool called HardInfo can provide you with a wealth of detail on all aspects of your installation: devices, file systems, users, network interfaces, benchmarks and more. You can get it from *http://hardinfo.berlios.de* or with 'sudo apt-get install hardinfo' in Ubuntu. When you need to get information quickly and easily (for example, if you're posting a help request in an online forum), HardInfo is very handy to keep around and you don't need to poke about at the command line.



No Control Panel? Just install HardInfo: this provides a one-stop shop for all aspects of your Linux box, from display settings through to USB devices.

Ask the questions

Get quicker answers to your questions. Post them at http://apcmag.com/askapc for other expert readers to answer online. A selection will continue to be published in the magazine.

Q Why is it that when you buy a hard drive (particularly USB external hard drives) they are formatted as FAT32 and not NTFS? After all, by far the majority of computers run operating systems that support NTFS, so this means the drive has to be reformatted. No real problem, except that I recently bought a 500GB drive and it took a couple of hours to reformat the drive. This does become a problem, as with the approximate 4GB file size limit of FAT32, these large drives need to be reformatted. When I go to set up systems for a client, it becomes a little awkward when you have to reformat the drive and it then takes a couple of hours to do so. You can't leave them as there is further setup that needs to be done after the drive has been reformatted.

Ian A. White (http://tinyurl.com/6fmzuv)

Q In the Ask *APC* column of your January edition, you referred to a way to stop Adobe Acrobat from needlessly trying to update. The constant updating is driving me nuts. On my computer I have Adobe Updater Certificate, Adobe Updater and Adobe Updater Manager. Which one am I supposed to delete?

Stephen Hunter (http://tinyurl.com/6an8gr)

Q Every so often when I boot my computer (ASUS P5K-E) into Windows Vista, this unclosable window appears on my desktop:

Is this an example of shoddy programming? What and how do I get rid of it?

Philip Podgorski (http://tinyurl.com.5g2d7f)

Q When I download a .pps file, it downloads till about 90%, and then it hangs the download. Same if I open file or save to disk. If I open the downloaded portion, it says PowerPoint cannot read the file. Downloading other files such as .docs, .wmv, .jpg etc., is not a problem. I have tried all I know. What is wrong?

Sarjeet & Foong (http://tinyurl.com/5cygk4)

Q I just have some questions about high definition. I am looking to buy a monitor. In particular I have been deciding between the Samsung 245B and the Samsung 2493HM.

The 2493HM states that it supports Full HD 1080p where the 245B does not. I am a little confused as I believe Full HD 1080p means you have resolution of 1,920 x 1,080?

Both monitors being 24in, they both natively support 1,920 x 1,200 — more than 1,920 x 1,080. Does that mean even if a monitor doesn't say its Full HD, would it still be able to play HD content?

Ice http://tinyurl.com/5qbh87

Q I use Outlook 2007, and sometimes attachments disappear from emails I send or forward. Most common are the PDF attachments not appearing on the recipients email. My Sent items show the email with the clip and the correct attachment when opened to check. It does seem to be items sent to the same people and I have to resend using Thunderbird and they receive them. I am using CA Security. The recipients think I have forgotten to attach the item.

Michael Pavert (http://tinyurl.com/68vagj)

Answer the questions

If you feel you can answer one of the questions above, please send the answer to askapc@acpmagazines.com.au.

If you can answer one of the questions above, please go to the web address listed at the end of each question.

Each month we publish the best of the questions and answers in the mag. You can still send your answers to us via email at **http://apcmag.com/askapc**, but we encourage you to post answers online so readers get quicker responses.

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SEARCH ENGINE OPTIMISATION

Part 1 OF TWELVE

WHAT'S COVERED

Overview
In this new Masterclass series, Ash Nallawalla walks you through everything you need to know in order to make your web site optimised for search engines. By the end of the Masterclass, you'll have all the tools at your disposal to generate traffic and get hits on your site.

ABOUT YOUR TUTOR

Ash Nallawalla
Ash Nallawalla manages natural and paid search traffic for some of Australia's largest web sites. He is an internationally acknowledged expert in search marketing and he previously operated an SEO training business. Ash can be contacted at *seo@acpmagazines.net* and he blogs at ***www.netmagellan.com.***

Did you build a web site and nobody came? *Ash Nallawalla* explains why and how you can attract the right visitors. This month he takes a high-level view of SEO — and he will delve deeper over the next twelve months.

Some describe Search Engine Optimisation (SEO) as a structured method of web site development. Another view is that SEO is a long-term strategy of online marketing. Which is accurate? Both are, but what SEO is really about, is traffic.

(We will use the abbreviation SEO interchangeably to refer to the activity and the search optimisers who perform it. The meaning will be apparent from the context.)

EMERGENCE OF THE WEB

Yes, SEO is entirely about bringing the right traffic (human visitors) from a search engine to a web site. This, in turn, increases the return on investment (ROI). Sounds logical so far, but how did the SEO profession emerge?

In the late 1990s, you could get a page to rank higher in search engines by using dodgy tactics such as hidden text, placing a long list of words in the meta tags, and so on. Many individuals made their fortunes in this manner, but very few business web sites were optimised. It wasn't until 2003 that the Australian SEO service industry became noticeable.

SEO AWARENESS

Today, many web site owners have embraced SEO. However, there is some cynicism, ignorance and misinformation out there. Many businesses are losing millions of dollars in sales because their products are invisible to potential buyers who use Google for most of their research.

When a marketer commissions a new web site, the specifications usually make no reference to SEO. Although the web designers are not at fault for omitting SEO features that weren't requested, many of them don't have SEO knowledge beyond phrases such as 'search engine friendly (SEF) URLs' or 'meta tags'.

A few months later, the marketer realises that the web site has few visitors. Such ignorant marketers either fail online or they pay for traffic through search engine advertising.

Large companies find it hard to implement SEO because:

1. Their IT department requires that solutions must conform to a standard operating environment (SOE), which is not concerned with maximising the company revenue.

2. The web site might be driven by some technology that costs millions of dollars and cannot be discarded. In my experience, web-related 'enterprise software' needs a room full of developers to make it SEF. Usually, there is no budget for this.

3. They ask for the 'wrong' technology, in a search engine friendly sense, such as a Flash-only site. Others ask for a minimalist site, where every page must end 'above the fold', that is, no scrolling. Such sites contain very little text, which is no good for a search engine.

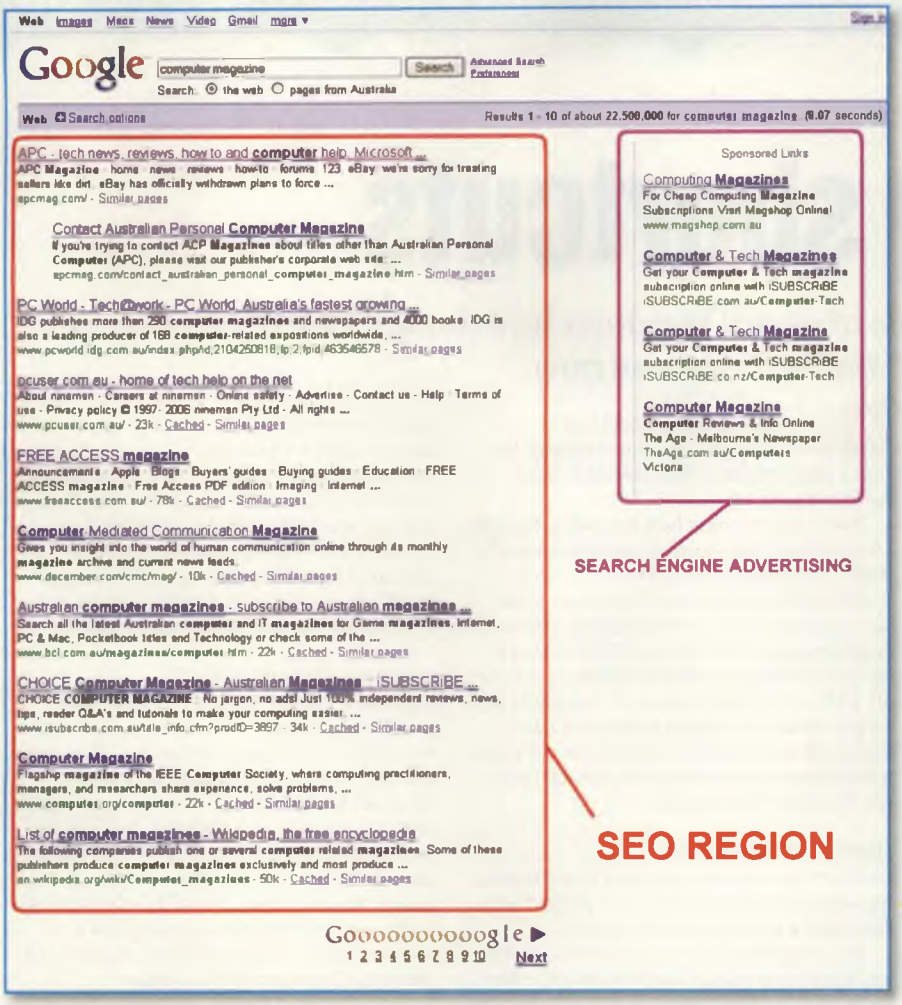
4. They get gouged by overpriced SEOs (I have seen a company pay a six-figure sum for a 1,000-page 'analysis' that was generated by a $500 tool.)

5. Their lawyers prevent them from engaging a small, competent SEO who does not have $10M worth of liability insurance, so they hire anyone else who has such insurance. Tip to small SEOs: quote six figures and spend some of it on insurance.

6. If they agree to implement SEO recommendations, they take months to get financial approval and months to effect the changes.

Small companies also find it hard to implement SEO, but it's usually because nobody wants to admit that they wasted money on getting an unoptimised site.

Cynics were either burnt by the work of a so-called SEO or have convinced themselves that SEO is mumbo jumbo at best or spam at worst. Believe me; by employing the simplest SEO



The *APC* Magazine site ranks #1 for "computer magazine" (as it should). SEO concerns the natural ("organic") search results on the left. Paid ("sponsored") ads appear on the right.

SEO INFO

SEM

The major search engines also operate advertising networks such as Google AdWords or Yahoo! Search Marketing and they have hijacked the term "Search Engine Marketing" (SEM) to refer exclusively to paid advertising. Not so! They really mean "PPC" (Pay-Per-Click) advertising. SEM includes SEO, PPC and Social Media Optimisation (SMO).

SEO JOBS

In Australia, a corporate SEO can earn as much as $200,000/year, although a lot of SEOs earn between $50,000 to $80,000. Check out conventional recruitment agencies and specialist web sites such as *www.recruitsem.com*. Self-employed SEOs routinely quote five- and six-figure sums to optimise corporate web sites.
If you have tinkered with web sites or are a web designer/developer, SEO can be your new career. The professional body for SEOs is SEMPO: ***www.sempo.org***.

DISCUSS THIS ARTICLE

Have you any questions about SEO?
Discuss in the *APC* Forums:
http://apcmag.com/forum.htm?g=topics&f=51

tactics, you will see improved rankings within weeks. I will not recommend 'black-hat' (risky) tactics here.

PRACTICAL SEO

These days anyone can call themselves an SEO. Some are successful (at least they have well-known clients) and some are not. Some have fancy offices and some are run from private homes. If you own a good suit, you can get a big-name client. Let's focus on making you a competent SEO and the suit can wait.

What does optimising a web site entail? SEO can be divided into two groups of activities: On-page factors and Off-page factors.

On-page SEO factors are changes you make to the web pages. You can make the HTML code more SEF. You can edit textual content, add more text and headings. If you are building a new site, design it for SEO, user experience and fit for purpose.

Off-page SEO factors mainly involve getting links from other web sites to yours. Sometimes you get such links indirectly, say, by issuing a press release that might lead to a magazine article that includes a link from its web site to yours. The story might be picked up by a blogger who writes about your site and gives you a link. You might mention your site on a social media site such as Facebook and get a link from someone. You might get no links but a lot of human visitors — perfect!

Links are so important for ranking success that you should put 60–70 per cent of your effort into this endeavour. Links are particularly important in highly competitive niches such as travel and finance. Most businesses overlook this element. Set aside a linking budget and hire a linking specialist if you need help.

SEO SKILLS

So who does the actual SEO work and what skills do they need? SEO is a marketing activity, as it is one element of Search Engine Marketing (SEM — see box above-right). Here is a way to solve a territorial dispute between IT and marketing:

- IT: Selecting the server, web site coding (may be outsourced). The specialist might have a degree in Multimedia or Computer Science, or web development experience. Bear in mind that there is a lot of open source software about and you rarely need to code a web site from scratch.
- Marketing: Performs the web design, writes content, researches the competition, chooses links and keyphrases and solicits links from other web sites. The specialists might have qualifications in graphic design, usability, marketing or equivalent experience.

SEO TRAINING

What about SEO training courses? Do not expect any depth from so-called 'training events' that consist of numerous speakers from well-known companies. The speakers might be senior executives or product managers who have never optimised a web site or run a paid search advertising campaign. They just want to sell you their services.

I no longer teach SEO in Australia, but I usually run just one workshop in India during my annual holidays there. This article series will save you the expense of that trip.

NEXT MONTH

- Understanding searchers and search engines.

Boosting shortcuts

Get speedy access to all kinds of useful Windows functionality with your own set of custom shortcuts. *Mike Williams* shows you how.

REQUIREMENTS

A REGULAR PC
Provided it's running Windows XP or Vista (32-bit version) you will be able to run most of our tips.

Add suitable icons to shortcuts by finding them using 'Properties > Shortcut > Change Icon > Browse'.

Windows is packed with all kinds of interesting ideas and technologies, but at first glance the humble shortcut doesn't seem to be one of them.

Take a closer look at how they work, though, and you'll see that shortcuts are more powerful than most people believe. They're not just restricted to launching applications; you can also use them to call other functions — from displaying a particular Control Panel dialog to turning the Windows Vista Aero interface on or off, and even rebooting your PC. You might be able to tweak other applications by starting them with command line switches, and it's even possible to assign a hotkey that will start your shortcut from the keyboard.

SIMPLE SHORTCUT TRICKS

Shortcuts can contain some very useful tweaks. Just right-click on one and select 'Properties > Shortcut' to see the available options.

The 'Target' property must point at the file you're trying to launch, but you can add other parameters. Create a shortcut that launches 'c:\windows\explorer.exe', say, and Explorer will open, pointing at your 'Documents' folder. Change the 'Target' to '"c:\windows\explorer.exe" c:\mypath' instead, and it'll open with the folder you choose. Many other applications support command-line parameters that will help you customise how they work: check their documentation for details.

The most exciting feature is the shortcut property that lets you define a hotkey to launch an application. If you generally navigate through your Start menu to run a certain program — Google Earth, for example — then display its shortcut properties instead and click in the 'Shortcut Key' box. Next, hold down the keys that you would like to use as your hotkey combination — something like Ctrl+Alt+E, perhaps. From now on, pressing that hotkey combination will launch Google Earth for you without any tedious menu browsing required.

WINDOWS EXECUTABLES

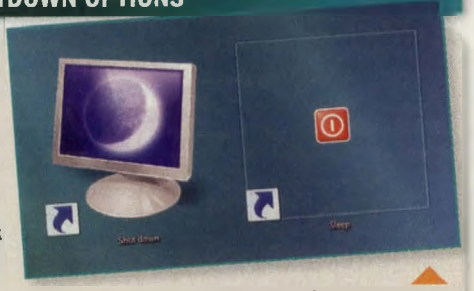
Creating keyboard shortcuts for your most popular applications may not save you that much time; they're probably on your Start menu anyway. However, what about keyboard shortcuts for Windows utilities? In Windows Vista, for instance, you can't directly open the 'Network Connections' page from your network connection or the Start menu — unless you build a shortcut, that is. To do this, right-click an empty part of the desktop, select 'New > Shortcut', enter 'ncpa.cpl' as the 'Location' and 'Network Connections' as the name.

SHORTCUTS CONTROL PANEL

TOOL	SHORTCUT TARGET
Accessibility options	control access.cpl
Add/remove programs	control appwiz.cpl
Date/time properties	control timedate.cpl
Display properties	control desk.cpl
Fonts folder	control fonts
Internet properties	control inetcpl.cpl
Keyboard properties	control main.cpl keyboard
Mouse properties	control main.cpl
Power management	control powercfg.cpl
Printers folder	control printers
Regional settings	control intl.cpl
Scanners and cameras	control sticpl.cpl
Sound properties	control mmsys.cpl
System properties	control sysdm.cpl

SPOTLIGHT ON... SHORTCUT SHUTDOWN OPTIONS

Don't like the new Vista shutdown menu? Why not use shortcuts instead? The Shutdown target is 'Shutdown.exe -s -t 00'; for Restart use 'Shutdown.exe -r -t 00'; Hibernate is 'rundll32.exe PowrProf.dll,SetSuspendState'; and Sleep is 'rundll32.exe Powr Prof.dll,SetSuspendState Sleep'. The 'Shutdown.exe' tool is particularly versatile and is able to shut down a computer on your local network ('shutdown.exe -s -m \\computername -t 60'). Open a command window and type 'shutdown /?' for a complete list of all the switches available.



Replace cumbersome menus with simple shutdown shortcuts.

HANDY TIP

You can easily create a shortcut by right-clicking the desktop and selecting 'New > Shortcut', but that's not the only way. You can also try dragging and dropping an entry from the Start menu, or dragging and dropping the icon from your browser address bar if you'd like a shortcut to a web site. If you want to create a shortcut to a file, folder or program that you're viewing in Explorer, just right-click it and select 'Send To > Desktop (Create Shortcut)'.

Also handy is the applet that shows you all the user accounts on your PC, lets you configure them, change their passwords, or turn off the requirement to enter a username and password at all. You can't do this with the regular 'Users' applet, but create a shortcut with the target 'control userpasswords2' and you'll have speedy access to this useful administrative tool.

You can do much the same thing to run most other Control Panel applets. Take a look at the 'Control Panel Shortcuts' table (left) for some ideas. Third-party applications sometimes add their own Control Panel applets, and they'll usually be started in the same way; by creating a shortcut where the target is 'control applet. cpl' (search for '*.cpl' files on your system to list all the possibilities).

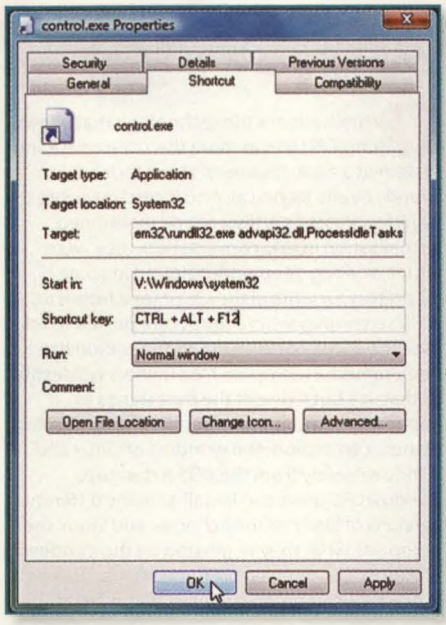
There are plenty of useful Microsoft Management snap-ins, too, and these all have the '.msc' extension. To launch Device Manager from a shortcut, use the target 'devmgmt.msc'; the Event Viewer is 'eventvwr.msc'; Services is 'services.msc'; and the Windows Vista Firewall can be found at 'wf. msc'. Again, search your system for '*.msc' files to find more.

DLL FUNCTIONS

The problem with running executables from a shortcut is that you don't get very clearly defined results. You might be able to run the 'Computer Management' applet, say, but it could still take several clicks before you reach the actual dialog box or function that you need. However, that's where 'RunDLL32.exe' comes in. This handy tool lets you access functions directly from a DLL file, producing more precise results.

If you've got an old PC or laptop running Windows Vista, you might find that the new Aero interface slows things down but that you also like features like Flip3D so you don't want to turn it off permanently. The answer is to create shortcuts letting you turn Aero on and off whenever you like. Use a shortcut with the target 'rundll32.exe dwmApi #104' to turn Aero off, and 'rundll32.exe dwmApi #102' to turn it back on.

You can also use RunDLL32 commands to create shortcuts that selectively clear your IE7 files. Use the target 'RunDll32.exe InetCpl. cpl,ClearMyTracksBy Process 1' to delete your history. Replace the '1' with a '2' to wipe your cookies, an '8' to delete your temporary internet files, '16' for Form Data, '32' for passwords or '255' to wipe everything.



Any shortcut can be launched from a custom hotkey combination simply by tweaking its properties.

RunDLL32 is particularly handy for accessing obscure but useful applets you didn't know you had. The 'Stored User Names and Passwords' applet stores network passwords, but locating it isn't easy. Create a shortcut with the target 'rundll32. exe keymgr.dll,KRShowKeyMgr' and you'll be able to launch it at the touch of a button.

ADVANCED IDEAS

The real power of RunDLL32 is its ability to execute commands that are difficult — if not impossible — to launch any other way.

Take Windows idle tasks as an example. Tools like System Restore and Windows Setup will sometimes postpone tasks until they think your PC hasn't been used for a while, which in theory is a good idea. But it also means that these tasks might be delayed for a long time, and if the idle detection algorithm fails then these tasks may run at an inconvenient moment. Even if it works perfectly, all that disk thrashing while you're not at the PC can be disconcerting.

The solution? Create a shortcut with the target 'Rundll32.exe advapi32.dll,ProcessIdle Tasks'. This tells Windows to execute any idle tasks straight away. Run this when you're doing something not too CPU- or disk-intensive or perhaps when you're stepping away from the PC. You can now be sure that any outstanding system tasks will soon be completed.

A similar problem may occur when you run a program that changes one of your user Registry settings — for example, the wallpaper file specified at 'HKEY_ CURRENT_USER\Control Panel\Desktop\Wallpaper'. In many cases, nothing will happen until you log out and log back in, but you can speed things up with a shortcut. Create one with the target 'RunDll32. exe USER32.DL L,UpdatePerUserSystemParamet ers ,1 ,True' and name 'Registry refresh'. Double-clicking it will force Windows to re-read your 'HKEY_ CURRENT_USER' settings. You should see an immediate update, without any reboot being required.

RunDLL32 isn't the best answer for every situation. You could set up a shortcut with the target 'rundll32.exe user32.dll, LockWorkStation' to lock your PC, for instance, but this can already be completed by pressing [Windows key]+L, so there's very little benefit. There are plenty of more useful commands available though, and you can see details on over 200 at DX21 (**www.dx21.com/SCRIPTING/ RUNDLL32/ REFGUIDE.ASP**). Pick out the ones that you need and you'll soon be enjoying a more efficient and productive PC.

HANDY TIP

Give your desktop a cleaner look by hiding the text for some shortcuts. Right-click a shortcut, click 'Rename', and press Delete to remove the existing text. Then hold down Alt, type '255' on the numeric keypad, and then press Enter. The Alt+'255' character is blank, so that shortcut will seem to have no text. You can't have two shortcuts named Alt+'255', so rename the second with two Alt+'255' characters, the third with three, and so on.

TAKE A CLOSE LOOK AT HOW THEY WORK AND YOU'LL SEE SHORTCUTS ARE MORE POWERFUL THAN MOST PEOPLE BELIEVE

Accessible Virtualisation

Virtualisation used to be expensive and difficult to use. VirtualBox is neither, and *Graham Morrison* proves it by installing Windows on a Linux desktop in no time.

REQUIREMENTS

- **A FAST MACHINE**
  As you might expect, the faster your processor the better your virtual machine will run, especially as the CPU is now doing twice the work.
- **LINUX INSTALLATION**
  We used the latest Mandriva release, but VirtualBox can be installed from the package manager of any modern Linux distribution. The steps required to install Windows will be identical.
- **MICROSOFT WINDOWS**
  A virtual machine needs a licensed copy of Windows, just like its real counterpart. VirtualBox is capable of running everything from Vista to Windows 3.1, but we've found XP Pro offers the best performance, and you're more likely to have a spare copy of this lying around.

Virtualisation is the technology that allows your CPU to run more than one operating system at a time. It's one of those terms that sounds overly technical. And it certainly used to be. A few years ago, if someone mentioned virtualisation in idle conversation, they were either working deep underground in some IT laboratory, or writing the script for a futuristic sci-fi screenplay where robots are poised to take over the Earth. Fortunately, virtualisation has been tamed. Even Apple Mac owners will testify to that. It's been one of the best things to happen to computing in recent times. Intel Mac owners can explore the wonders of Linux and Windows safely from their OS X desktop. Windows PC users can install as many different versions of Linux as they choose, and Linux users get to see what they're missing on the Windows platform. Commercial products such as Parallels Workstation and VMware have helped to make virtualisation mainstream, and as long as you're willing to pay for their products, virtually anyone can virtualise.

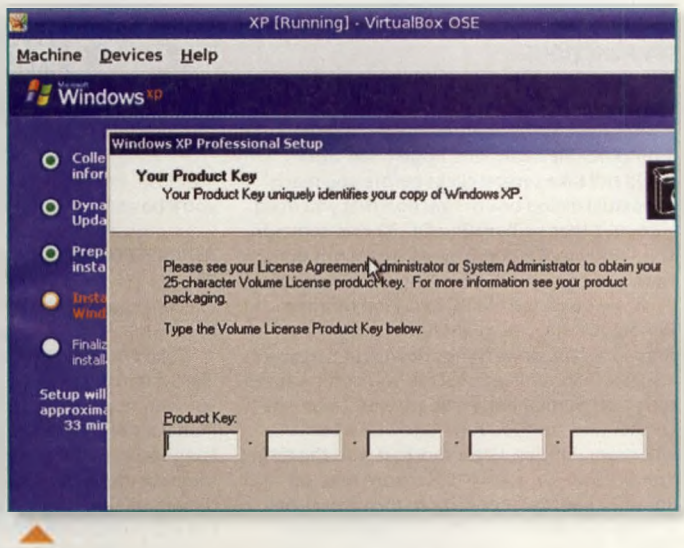
VIRTUALBOX

However, free and open-source solutions are also available. XEN is one of the best known. It grabbed all the headlines when it was first rolled into the Linux kernel, and it's widely used in server environments — hosting virtual machines running web sites. Virtual hosting has become big business. Virtual machines are cheaper and easier to maintain than the real thing, and you can safely run servers without worrying about wayward processes escaping from the virtual host and wreaking havoc on other sites running on the same physical machine. However, XEN is difficult to install and configure and, as a result, has failed to win many desktop fans. Fortunately, there's another option. VirtualBox has gained real momentum over the last 12 months. In January 2007, after several years of active development as a proprietary piece of software, VirtualBox OSE (Open Source Edition) was released under the terms of GPL, effectively making it as free as Linux. From that point on, you could often find it bundled with many Linux distributions. It developed at such a pace that it caught the eye of the venerable Sun Microsystems, which bought the company behind VirtualBox earlier this year.

INSTALLATION

Like every other Linux-based virtualisation solution, VirtualBox is tightly linked to your kernel version. This is because it works at a fundamental level, hijacking certain parts of the kernel for its own use. To do this, VirtualBox needs its own drivers. These need to be installed at the same time as the main package. If you're using a mainstream distribution, then you won't need to worry about this too much, as installation is as straightforward as searching for 'virtualbox' in your distribution's package

It's fast to run Windows within a virtual machine thanks to the power of new multi-core processors.



Microsoft's Genuine Advantage checks will stop you from using an unauthorised copy of Windows.

Installing VirtualBox on recent Linux installations is as easy as: open the package manager, search for the package, click on install.

Installing Windows on a virtual machine is exactly the same procedure as on real hardware and shouldn't take more than 45 minutes.

manager. Ubuntu users, for example, should open Synaptic and search for 'virtualbox-ose', as well as the generic 'virtualboxose-guest' module. Only modules that are compatible with your current kernel will be listed. Ubuntu users will also have to add themselves to the 'vboxusers' group using the 'Users and Groups' configuration window, and it's a similar process for both Fedora and Mandriva users too. If you do come across problems running the application, then you should either reboot your machine or type the following from the command line as the system administrator:

```
modprobe vboxdrv
```

You will then be able to launch VirtualBox from your applications menu, or from the command line by typing 'virtualbox'. If you've ever used Parallels Workstation or VMware, then VirtualBox is going to feel very familiar. Its user interface takes a very similar approach to creating virtual machines. Click on the New button to get started. This will open the New Virtual Machine wizard, and most pages are self-explanatory. Choose a descriptive name and select the type of operating system you want to install from the drop-down list. This is important because VirtualBox will optimise itself for your selection. Next, select how much memory you want to dedicate to the virtual machine. Just like in real life, the more memory you throw at Windows, the better it will perform. However, this will also reduce the amount of memory available to Linux, so you need to find a decent balance. A reasonable minimum is 512MB, but if you have more memory to spare, 1GB will perform much better. Virtual machines perform dramatically better with more memory, but real machines suffer as a result, so you may need to experiment through trial and error a little.

After memory allocation comes disk space. VirtualBox uses virtual disk images that bundle the entire contents of a virtual hard drive into a single file. They're even compatible with VMware images, and you can select these if you have any by clicking on 'Existing'. However, for most installations, you need to click on 'New' to step through the virtual disk creation wizard. Choose 'Dynamic' for disk space, as this will only use as much room on your real hard drive as the data stored on the virtual one. You will then be asked for the maximum size you need for the drive. As with memory, the more the better, and this is going to be directly influenced by the number of applications you may want to install into the Windows virtual machine, but you also need to have the real-world space to spare. If you run out of virtual space, you can always create another virtual disk and use this as an additional hard drive within the virtual machine. The virtual disk will be created and automatically assigned as the primary boot drive. This completes both the disk wizard and the 'New Virtual Machine' wizard.

RUNNING WINDOWS

VirtualBox will now display an overview of the virtual machine you've just created, and you can alter any parameters from the 'Machine > Settings' menu. We need to use this to enable the CD/DVD drive so that we can boot off the Windows install CD. Switch to the CD/DVD ROM page and enable 'Mount CD/DVD ROM Drive'. If you have more than one drive connected, make sure the correct one is enabled from the drop-down list below the tick box. Click on 'OK' and we're ready to launch the virtual machine. Press the green Start button in the toolbar and read the information window that appears. This is telling you VirtualBox will take complete control of your keyboard and mouse. You won't be able to switch back to Linux without the special key combination. By default, this key combination is the right Ctrl key, but you can change this to anything you like.

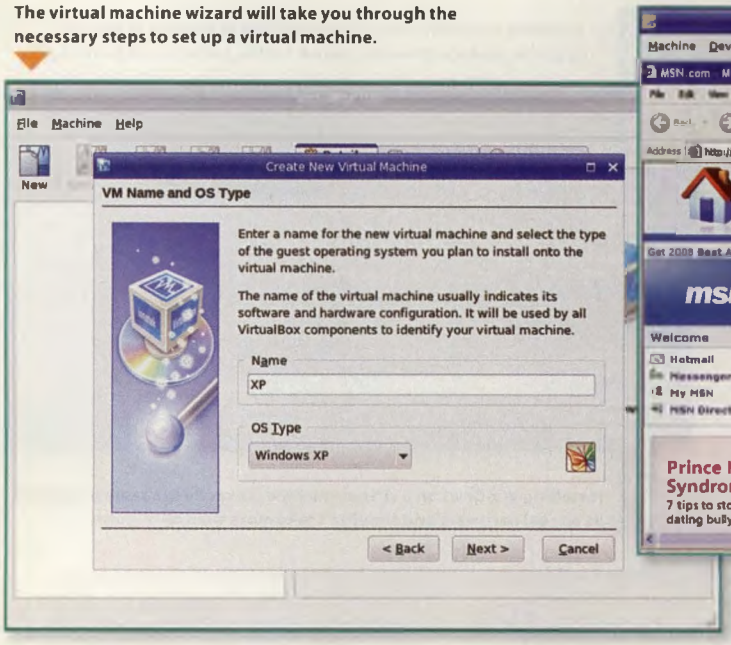
SPOTLIGHT ON... THE LEGALITY OF VIRTUALISATION

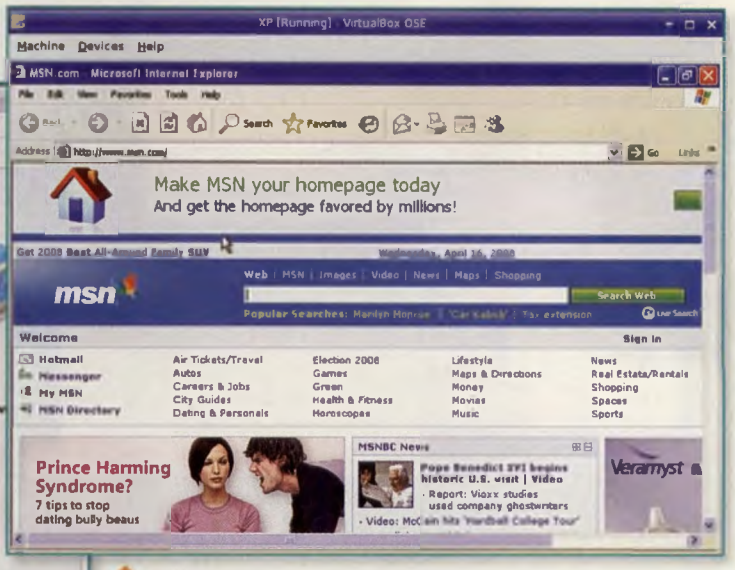
As well as getting your favourite operating system to run inside a virtual machine, you also need to contend with the terms of use in its licence agreement. If you had a spare copy of OS X, for instance, Apple strictly won't allow it. And Microsoft aren't always sure. The OEM licence for XP Home states: "This licence may not be shared, transferred to or used concurrently on different computers. The software is licensed with the computer as a single integrated product and may only be used with the computer." This means that if you're planning to install an OEM version of XP Home, it can only be installed and used on a single virtual machine.

XP Professional doesn't have this restriction. From the EULA, "You may move the Software to a different Workstation Computer." This means if you've got an old version of XP Pro no longer being used, you can safely install it onto your virtual machine.

Things aren't quite so straightforward with Vista. Microsoft has changed the licence agreement over the last couple of years, reflecting its changing attitude towards virtualisation. Initially, you couldn't run the cheapest versions of Vista (Home Basic and Home Premium) on a virtual machine, as the EULA prohibited their use. "You may not use the software installed on the licensed device within a virtual (or otherwise emulated) hardware system." However, in January of this year, Microsoft relented and updated the terms of the agreement to allow virtualisation. "Instead of using the software directly on the licensed device, you may install and use the software within only one virtual (or otherwise emulated) hardware system on the licensed device."

The virtual machine wizard will take you through the necessary steps to set up a virtual machine.





You can run Windows applications in a window and they behave just as you would expect.

A few moments later you will see the start of the Windows installation routine. How this stage progresses is entirely dependent on which version of Windows you've chosen to install, but there are few issues common to all. Don't worry about the reformat hard drive option as this is only going to affect the drive connected to the virtual machine. Remember, Windows has no idea it's running in a protected environment and has no way of accessing your real hardware (other than through the devices you've configured in VirtualBox).

When you get to the inevitable reboot stage, also remember to remove the CD/DVD from the drive. You can do this by selecting 'Unmount CD/DVD ROM' in the Devices menu. With Windows XP, we found we had to do this temporarily after the first reboot so that the Windows installation could continue. You should find everything else proceeds just as it would if you were installing Windows on real hardware.

SPECIAL FEATURES

XP Pro took less than 30 minutes to install on our Intel Core 2 Duo machine. And before too long, we found ourselves looking at the default Windows desktop. This is now a fully functional Windows machine, ready for any software you might want to install.

VirtualBox does a great job, but there are plenty of features that may not seem immediately obvious. For example, you can pause, reset and shutdown the virtual machine from the Machine menu in VirtualBox. These functions operate just like their real world counterparts, so you need to be careful. If you reset the virtual machine while it's writing data, or before you've saved the Windows document you might be working on, you will lose that data.

A virtual machine is just like the real version. One of VirtualBox's best features can help with backups though, and that's the 'snapshot' facility. If you've ever used a C64 or Spectrum emulator, you'll already know what snapshots are. They're a copy of the running state of the machine, written to a file so that the emulator can launch from that point by simply loading the file.

VirtualBox snapshots offer the same functionality, saving the state of your running machine. You can access them from the main user interface, clicking on the Snapshots tab, which lists each snapshot attached to a running machine. You can create as many as you like, with the only caveat being they take up a fair amount of room as they're storing memory contents directly to a file.

Another excellent feature is the 'Virtual Guest Additions' option, available from the Devices menu. Clicking on this will give you the opportunity to download a CD ISO image that contains some useful added functionality for the virtualised operating system. The disc is mounted automatically, and Windows will run the setup.exe on the disc. The setup routine will then install custom drivers for the virtualised graphics card and network adaptor in the virtual machine and make a few other modifications to the operating system.

After installation, you'll be able to drag your mouse into and out of the virtual machine without bothering to use the keyboard shortcut. You can even copy and paste between the two operating systems, and you can also resize the virtual machine window. The enhanced graphics driver will resize the Windows desktop to fit the new size. If you need to share files between the two, click on 'Shared Folders' in the Devices menu. Click on the 'Add' symbol and a folder requester will open. You then need to select a folder you want to access from the virtual machine. From Windows, open a DOS prompt ('Start > Command Prompt'), and type 'net use x: \\vboxsvr\directory', replacing directory with the name of the shared folder as shown in the Shared Folders window. This action will mount the folder onto the Windows system, and you'll be able to access this as 'x' either through Explorer or the My Computer application.

DO THIS... INSTALL ANYTHING

There's no reason why you should restrict VirtualBox to running Windows – it's a virtual x86 machine, so you can run anything that requires an x86-based processor. This includes nearly every version of Linux, along with other OSs like Solaris and Syllable. Each can be installed at the same time, and you choose which to run when you launch the main VirtualBox application. One of the best reasons for using VirtualBox in this way is to try the latest Linux releases. Installing them into a virtual machine won't affect your working Linux installation, and avoids the hassle of partitioning your hard drive and multi-booting your machine. You can also boot Live CDs directly without going to the trouble of burning a disc. The CD/DVD ROM settings page lets you use an ISO image instead of a CD-ROM, and this means you can download an ISO of your favourite Linux distribution and install it within VirtualBox directly. And the best thing about Linux is that you don't need to worry about licensing issues, as you're free to use as many installations as you need. This makes Virtual Box the perfect test bed for new releases.

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Silverlight photo gallery

Put the power of Microsoft's amazing new technology to work managing your photographs. *Paul Hudson* shows you how.

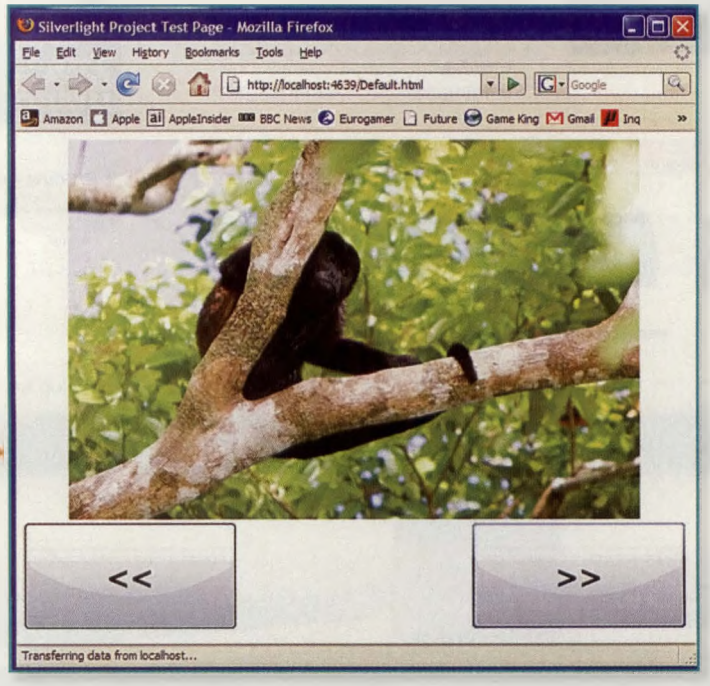
REQUIREMENTS

- **SILVERLIGHT 2 BETA 1 SDK**
  Download from www.tinyurl.com/2spyr4.
- **MICROSOFT EXPRESSION BLEND 2.5 JUNE PREVIEW**
  This will help you create your interface. Download it from http://tinyurl.com/2fevrm.
- **VISUAL STUDIO 2008 PROFESSIONAL**
  The actual programming interface. Download it from http://tinyurl.com/5gyfwt, unless you're a student, in which case you can get the full version for free from https:// downloads.channel8.msdn.com.

Mention Silverlight to someone and they're likely to respond either 'What?' or 'Isn't that the JavaScript thing?' While it's clear that Microsoft's marketing team have a long job ahead of them, that doesn't stop code-heads from taking advantage of new technology now. In fact, it's sometimes good to jump onboard a bandwagon before everyone else: by the time the world wakes up to the new technology and starts recruiting for people with experience, you're sitting pretty, ready to dictate your terms.

We covered Silverlight in *APC* March (page 109) and, yes, it was all about JavaScript back then. However, that was Silverlight 1, the first version of the system. Silverlight 2 takes all the effort from Silverlight 1 and adds one big improvement: it supports C# and a large chunk of the .NET Framework. Think about it — Adobe Flash, without the horrors of ActionScript, using C# instead. Shockingly powerful? Yup. Screamingly fast? Heck yes. Download the tools from the links at the side and get ready to dive in.

Part of the magic of Silverlight is that it is quite clearly designed with coders in mind, because it splits the creation of projects into two parts: design and coding. The design side is handled through Microsoft Expression Blend, which is akin to Adobe's Flash development environment — you draw shapes, add pictures, and so on, then create timelines for animation. This is all done using the Windows Presentation Framework, a DirectX-powered layout engine that was introduced with .NET 3.0 and Vista (but don't hold that against it). Being backed by DirectX means that WPF is lightning fast and fully capable of doing all sorts of visual effects in real time. And while Blend handles all the layout, Visual Studio is there to handle all the coding and is where you can hook events up to your user interface and provide all the real functionality. That's the magic: your designer can be working in Blend while you're working in Visual Studio, and you're both sharing the same project without treading on each other's toes.



The finished product scrolls between photographs, loading them on the fly to save bandwidth and RAM.

VISUAL STUDIO, BLENDED

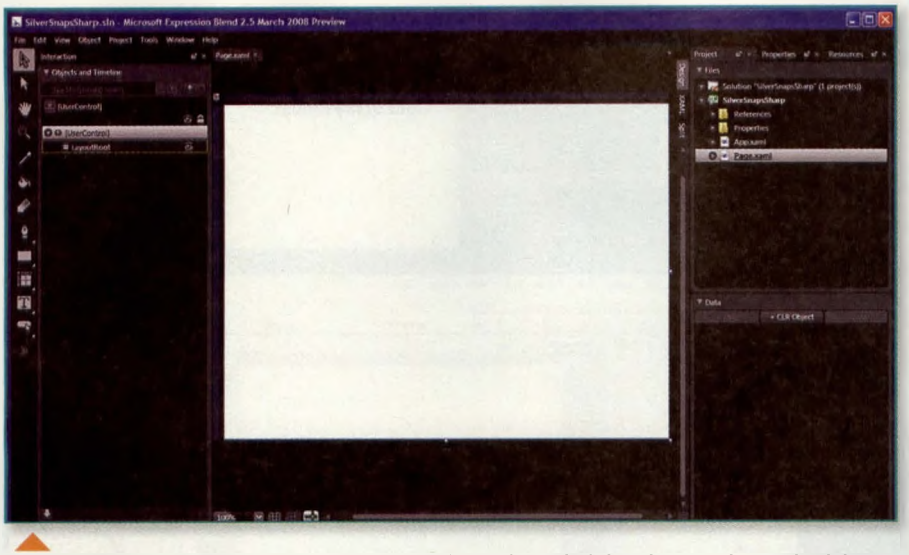
The Silverlight SDK for Visual Studio 2008 comes with all the .NET assemblies needed to compile and test SL2 apps, but it also comes with a first attempt at a Silverlight GUI designer. Don't use it! That's what Expression Blend is for, and it does it much better. So, to get started with our project, first start up Expression Blend (make sure it's the 2.5 June Preview, mind), then choose 'Projects > New Project' from the welcome screen. Choose the 'Silverlight 2 Application' option and name it 'SilverSnapsSharp'; in the previous Silverlight tutorial the project was called 'SilverSnaps', and as we are now using C#, the new name seems appropriate.

On the right of the 'Blend' window is the 'Project' pane, which should include 'App.xaml' and 'Page.xaml'. Note that each one of these has a small arrow to its left, because each XAML file also has a 'code-behind' file with the .cs extension — that's where all your lovely C# code goes. The 'app. xaml' is largely forgettable, so ignore it: 'page.xaml' is the main event, and it will be opened for editing by default. That's what the big white gap is in the middle of your screen.

So, we have a big white gap ready to be filled with a fantastic project, and the first step towards that goal is creating the program design to do it.

DRAG-AND-DROP XAML

Along the left of the 'Blend' window are some simple user interface elements and shapes, and at the bottom of that list is a double chevron icon that opens an 'Asset Library' window. Click that now, and then click the 'Show All' checkbox



A clean Blend canvas ready for you to draw on. Use the 'Tools' on the left and 'Properties' on the right to drag-and-drop your way to the perfect look.

> PART OF THE MAGIC OF SILVERLIGHT IS THAT IT IS QUITE CLEARLY DESIGNED WITH CODERS IN MIND

in the window that appears. What we want for this project is an image in the middle of the screen showing the active picture, plus two buttons to scroll left and right in the gallery. Once you drop the items onto the canvas, you can move and resize them as much as you want — notice how Blend helpfully shows measurements as you resize things? It will also snap objects to borders and other objects to help give your interface neat spacing.

What we're aiming to do is to make one button sit on the bottom left of the canvas and the other sit on the bottom right of the canvas, with the image taking up the rest of the space. To the right of the 'Expression' window is the 'Project' pane (where you can see 'App.xaml' and your other files), as well as two other tabs: 'Properties' and 'Resources'. Click one of your buttons and select the 'Properties' tab to see a vast collection of options. This is where XAML starts to really show off its power, letting you change colours, masks, alignments, opacities, brushes, margins, scaling, shearing, skewing, flipping and much more — all for objects such as buttons that were ugly little bitmaps in older versions of Windows.

The 'Properties' system in Blend is just like the 'Properties' in Visual Studio. Near the top of the tab is the 'Name' box for the selected element, and to the right of that are two buttons that toggle between the 'Properties' and 'Events' views, again just like Visual Studio.

This means that designers can hook events up to objects — double-clicking on events in Blend will create a default event handler, then fire up Visual Studio so that you can provide the code. Of course, just because you can do something doesn't mean that you ought to; if you want to keep your design and code separate, it's best to avoid hooking up events using Blend. For now, lets just use the 'Properties' window to assign names to the three objects: 'imgShowing' for the image, 'btnLeft' for the left-hand button and 'btnRight' for the right-hand button. You might also want to give some better text to your buttons, because 'Button' isn't very interesting. This text is hidden away in the 'Miscellaneous' options under the title 'Content', along with other options like font size and weight.

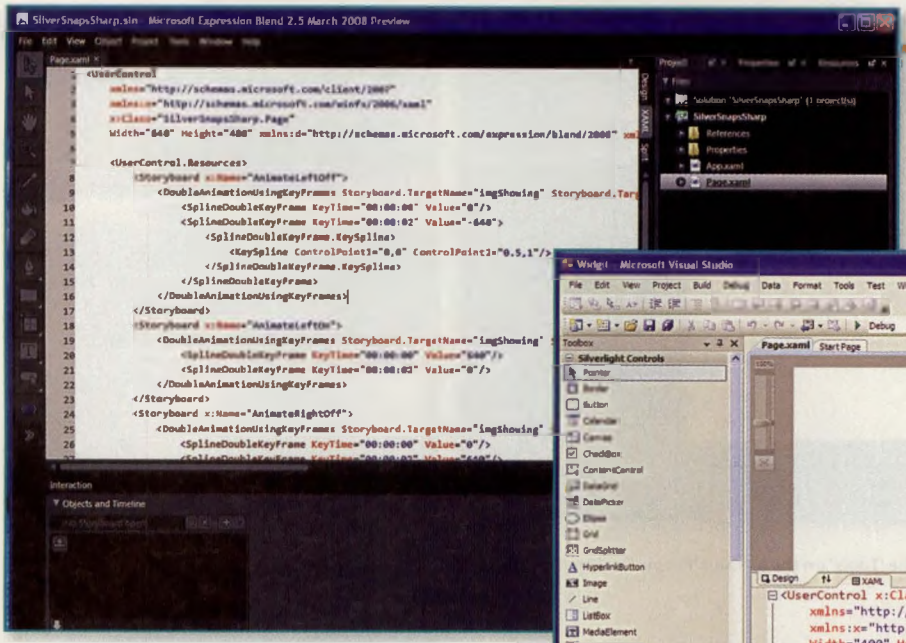
You can add an animation using the current workspace, but there is a special workspace layout for animation that re-arranges things — click 'Window > Active Workspace > Animation' to activate it. The bottom part of the screen is now dedicated to animation timelines, and just below and to the right of the words 'Objects and Timeline' is a small '+' button. Click it to create a new storyboard resource and name it 'AnimateLeftOff'.

The right hand of the Blend window hosts the 'Properties', 'Project' and 'Resources' panes.

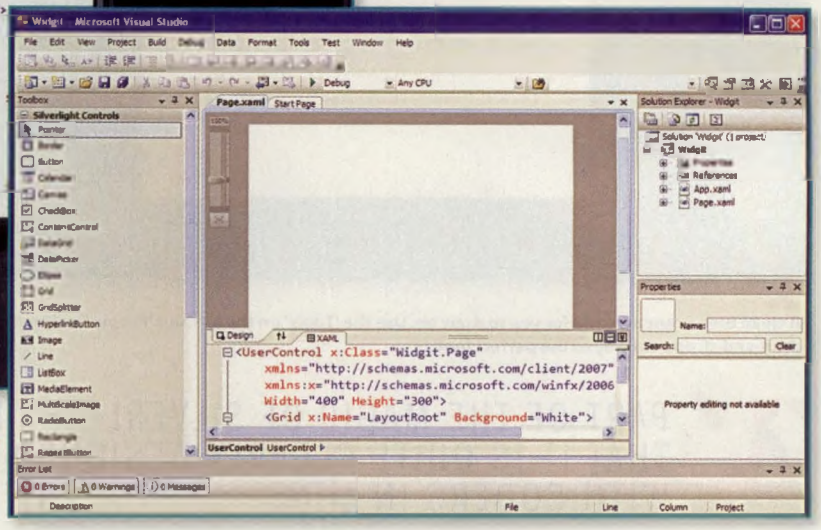
SPOTLIGHT ON... WINDOWS PRESENTATION FOUNDATION

Windows Forms was a .NET layer on top of the old Windows user interface, but WPF – previously codenamed 'Avalon' – is an entirely new user interface library that brings together 2D, 3D, fonts, animation, data, audio and much more. Silverlight implements only a subset of the full WPF functionality (most notably there's no 3D support – shame!), but both focus on the same XAML interface system.

As a result, you'll find you can use all sorts of neat user interface elements, including scrollbars, radio buttons, splitters, calendars and more.



Expression Blend generates all the XAML for you — if you want to look behind the scenes click the small 'XAML' tab just to the right of the canvas.



You can create Silverlight 2 projects using nothing more than Visual Studio 2008, but the GUI designer is read-only — and Blend is just better, frankly.

As with Adobe Flash, Blend creates movement by tweening between keyframes, so click 'imgShowing' from the list of objects in the 'Objects and Timeline' pane, make sure '0' is selected on the timeline, and then click the green '+' icon to add a keyframe at the beginning of the animation. Now move the timeline to two and add another keyframe. Then, at that keyframe, drag the image off to the left of your canvas. If you drag the timeline position between 0 and two, you'll see the image box moving off the screen smoothly. This is because Blend interpolates all the frames between those two keyframes.

That's how animation is done. What you need to do is create a total of four animations: 'AnimateLeftOff' (the image moves from the centre to the left), 'AnimateLeftOn' (the image moves from the right to the centre), 'AnimateRightOff' (the image moves from the centre to the right) and 'AnimateRightOn' (the image moves from the left to the centre). These four animations mean that the user can slide the gallery left and right as needed using the two buttons that you created earlier. To create a new animation after 'AnimateLeftOff', just go ahead and click the first '+' button to create new storyboard resources. Once you've created those animations, it's time to write some code. At last!

THE FUN PART

What our code needs to do is pretty simple: load a list of pictures, store which picture is currently being viewed, hook up events to the left and right buttons, then run the animations at the appropriate times.

To get started, get back to the 'Project' tab, click the arrow next to 'Page. xaml' and double-click the 'Page. xaml.cs' file to open it in Visual Studio. That list of pictures is actually just going to be stored as a list of filenames, because there could potentially be many and there's no point wasting RAM by loading pictures that aren't used. At the top of the file add:

```
using System.Collections.Generic;
using System.Windows.Media.Imaging;
```

Then add these two just before the line 'public Page() {':

```
List<string> Images = new List<string>();
int CurrentPos = 0;
```

That 'Images' array will hold a list of strings, with each one of those strings being the filename of a picture that we want to include in the gallery. The 'CurrentPos' integer will store the position of the picture that's currently being shown, so that we can tell which one to switch to when one of the buttons is clicked. We're going to be using just four pictures in our gallery, so I have these four lines in the Page() constructor:

```
Images.Add("cr_arenal.jpg");
Images.Add("cr_howler2.jpg");
Images.Add("cr_hummingbird. jpg");
Images.Add("cr_redfrog.jpg");
```

Below those, type this:

```
btnRight.Click += new RoutedEvent
Handler(btnRight_Click);
```

You'll probably find you make it as far as 'b' before Visual Studio starts prompting you for completion. When it prompts you with an auto-complete option after the '+=', just press Tab twice to accept its recommendations, and you'll find yourself looking at a skeleton 'btnRight_ Click()' method. We'll fill that in later, but for now you should also add a skeleton for 'btnLeft. Click' as well.

DO THIS... EASING IN AND OUT

As with Flash and other vector animation packages, the XAML animation framework is very flexible — you can animate multiple objects at a time, you can change their position, size and other properties on the fly (even using code if you want to), and you can set movement easing to make objects accelerate or decelerate smoothly. To set easing, right-click on a keyframe, choose 'Ease In' or 'Ease Out', then set a percentage value.

The last thing to do in the 'Page() constructor' method is to show the initial image, which we'll do with a call to the 'ShowImage()' method. That method doesn't exist yet, so let's create it now. Here's the code:

```
void ShowImage() {
Uri uri = new Uri(Images[CurrentPos], UriKind.
Relative);
BitmapImage bi = new BitmapImage(uri);
imgShowing.Source = bi;
}
```

Now, you might be wondering why we have to refer to local pictures as URIs rather than just files, but remember that Silverlight is aimed at web content, where files are unlikely to be local, and it's designed to be secure, so reading from local files is a bit harder to do. Using the 'ShowImage()' method we can show any of the four pictures just by adjusting 'CurrentPos' then calling 'ShowImage()' again.

WORKING WITH ANIMATION

If you run the program now, you'll see that the first image loads but neither of the buttons work. Let's change that by making them call the appropriate animations and hooking up some more events.

On a right-hand button click:

1. Both buttons should be disabled, so that the user can't click them again.

THINK ABOUT IT – ADOBE FLASH, WITHOUT THE HORRORS OF ACTIONSCRIPT, USING C# INSTEAD

2. The image needs to be moved to the left.

3. When the image is fully off to the left, it needs to be changed and then moved on from the right.

4. When the image is back in the centre again, the buttons need to be re-enabled.

First, add this code to the body of the 'btnRight_Click()' method:

```
if (CurrentPos >= Images.Count – 1) return;
++CurrentPos;
btnLeft.IsEnabled = false;
btnRight.IsEnabled = false; AnimateLeftOff.
Begin();
```

Notice that we've slipped in a bit of error checking at the beginning to ensure that we don't try to move beyond the number of pictures there are. Calling the 'Begin()' method of animation makes it start, which means that method accomplishes points one and two from our requirements. To accomplish points three and four, we need to attach event handlers to the 'AnimateLeftOff' and 'AnimateLeftOn' animations that will call some code when the animations finish. Edit the end of your 'Page()' method to read this:

```
btnRight.Click += new RoutedEvent
Handler(btnRight_Click); AnimateLeftOff.
Completed += new EventHandler(AnimateLeft
Off_ Completed);
AnimateLeftOn.Completed += new EventHandl
er(AnimateLeftOn_ Completed);
```

When 'AnimateLeftOff' has finished (ie. when the image is entirely off the screen), Silverlight will execute the 'AnimateLeftOff_ Completed()' method. Feel free to have Visual Studio generate stubs for those two, by the way, as it saves you doing it yourself.

The 'AnimateLeftOff_Completed()' method needs to accomplish point three from the requirements list: it needs to change the picture while it's offscreen, then start moving it on from the right. In code, that's:

```
ShowImage();
AnimateLeftOn.Begin();
```

When 'AnimateLeftOn' finishes, it needs to re-enable the buttons so that the user can make another action. Seeing as that's just the reverse of some earlier code, it should be easy for you to do!

Remote control inbox

We take a look at what webmail services have to offer and uncover a host of hidden features. *Karl Hodge* reports.

REQUIREMENTS

- **AN INTERNET CONNECTION**
  (And one or two email accounts such as Gmail and Windows Live Hotmail.)

The perception of webmail is that it's great as a backup. It's the email address you can give to online services and fair-weather friends without fear of cluttering up your 'real' inbox. However, we think Google Mail and Windows Live Mail are getting so good that they can now match your desktop mail client feature for feature. In fact, with all the extra advantages online mail already offers, it could be time to switch to a webmail account and ditch your deskbound address altogether.

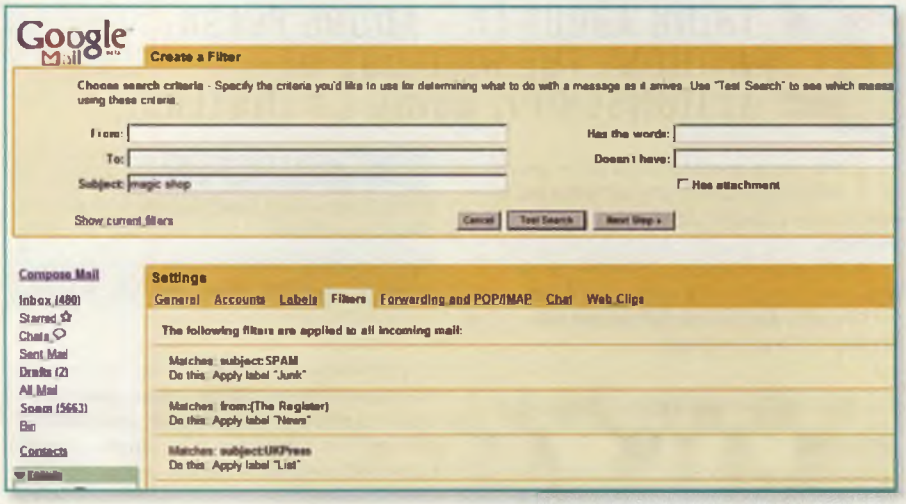
ACCESS ALL AREAS

Portability is the biggest selling point of webmail. You can access your email from any computer with a web connection — whether that's your mate's machine, a coffee-splashed PC in an internet cafe or a Wi-Fi-enabled notebook. This also means you're not tied to one ISP. If you move to another provider, your email address can move with you.

We all dread booting into a blue error screen, but if your primary email account is online that's one thing a local hard drive failure can't destroy. Of course, you should backup all your data including your webmail regularly. Recent changes to online services have made this easier than ever. These are the main rewards for switching, but webmail adopters also enjoy faster archive searching, generous storage allocations and a range of extra features not usually available with free desktop clients.

Of course, it's not all lollipops and milkshake rivers in webmail town. Putting your mail online means there's a small but increased chance that someone else might access it by nefarious methods. Though there have been several security loophole scares over the years, webmail is as safe as you make it. Make sure you're logged out and cookies are cleared after using a shared or public machine, change your log-in details frequently and steer clear of easy-to-crack security questions and passwords.

Filters are configurable rules that you can apply to any incoming messages. Use them to organise mail, forward it to other accounts or bin spam.



BACKING UP WEBMAIL

We mentioned the vexation of losing emails in a local crash and, although it's rare, it's not unheard of for online services to lose data too. If you're an Outlook Express user then Windows Live Mail, formerly known as Hotmail (**www.hotmail.com**), has a perfect way to keep local backups of your online email. Open Outlook Express and go to 'Tools > Accounts'. Click the 'Mail' tab and then the 'Add' button. When prompted, enter your name then the Hotmail address for the account. On the 'E-mail Server Names' screen select HTTP as 'My incoming mail server' and Hotmail as your service provider. Click 'Next' and fill in your account address and password. When the new account has been

SPOTLIGHT ON... WINDOWS LIVE MAIL

Hotmail is currently undergoing significant changes as part of Microsoft's rebranding and overhaul of its online services. Though Windows Live Mail is still in beta, it's now open for everyone to try. If you already have a Hotmail address, sign in and click the 'Windows Live Mail beta' button to switch your account. If you don't have a Hotmail address, sign up for one then switch to the Live Mail beta after logging in.

Benefits you'll enjoy include 2GB of storage, a drag-and-drop interface and a context-sensitive menu to delete, reply and forward mail when you right-click. You also have a great deal of control over the look of the Live Mail interface, with selectable themes and an editable layout.

Though Live Mail is slickly themed, it lacks some of the features Google Mail users take for granted. There's no POP mail access and no tagging, but the conventional, folder-based file system may appeal more than Gmail's message board styling.

Microsoft's commercial version of Hotmail guarantees your mail and enables POP access.

Digsby connects to Facebook and MySpace, Gmail, Hotmail and Yahoo! and can even be used as a universal Instant Messaging client.

Gmail's ability to use bespoke 'From:' and 'Reply to:' information makes it ideal for use as a business account — as long as you make frequent backups.

created, Outlook Express will download the current mail stored in the folders on this account. It will leave copies on the server.

You can access your Google Mail account with Outlook Express (or any other mail client) using POP rather than HTTP. Once logged into your account, click 'Settings' and click the 'Forwarding and POP' tab. Enable POP by selecting either 'Enable POP for all mail' or 'Enable POP only for mail that arrives from now on'. By default, Google Mail keeps copies of downloaded mail on the server — which is what you want. Click the 'Configuration Instructions' link to find out how to connect to the Google Mail POP server with your mail client.

To back up Hotmail or Google Mail messages stored in Outlook Express go to 'Tools > Options'. Click the 'Maintenance' tab, then the 'Store Folder' button. You'll see a local path to your mail folder. Highlight this path and copy it to the clipboard. Open Explorer then paste the path into the address box. You'll see a folder containing a series of *.dbx files, each corresponding with a mail folder in Outlook Express. You can back these up to disc or make more easily accessible copies elsewhere on your local drive.

THE PERSONAL TOUCH

You might be reluctant to use a webmail service as your primary address as it looks cheap. There's a fix for this, but you'll need a domain name of your own first. Most hosting services provide mail forwarding to any domain you've parked with them. Check your host's documentation and forward the domain, or a selected email address on that domain to your webmail account. You can now hand out a more professional-looking address to clients, friends and the bloke next door.

With both Windows Live Mail and Google Mail, you can change the 'Reply to:' address so it points back to your chosen domain rather than to your webmail account. In Google Mail you do this in 'Settings > Accounts'. In Live Mail choose 'Options > More Options' then click 'Send mail from different email addresses'.

Live Mail lets you go even further. With Windows Live Custom Domains, you can associate the mail record of a domain name you already own directly with your account and add as many users as you like to that domain. Go to **http://domains.live.com** for more details.

PORTABILITY IS THE BIGGEST SELLING POINT OF WEBMAIL: YOU CAN ACCESS YOUR EMAIL FROM ANY COMPUTER

READY TO LAUNCH

If you've ever clicked an email link in your web browser, you'll know that it launches a new mail composition window in your default email client. This can get a bit annoying if you've switched to webmail. Curse not though, a quick fiddle under your browser's bonnet can change this. Internet Explorer 7 has direct support for Live Mail. Go to 'Tools > Internet Options' and click 'Programs'. Select Windows Live Mail from the Mail drop-down. This will enable you to connect Live Mail as well as older Hotmail accounts. Even if you're using another browser, an Internet Explorer window will launch and open your Windows Live Mail account.

Curiously, Mozilla Firefox has a hidden configuration setting for the default mail client it launches, and it's not accessible through the browser's GUI. But there is an easy way to get the app to open 'mailto:' links in Google Mail. In Firefox, install Gmail Manager from **www.longfocus.com/firefox/gmanager**. This not only detects 'mailto:' links and forwards them to Gmail — it also helps you to manage multiple accounts.

Want to open mail links in Google Mail with Internet Explorer instead? Download and install Gmail Notifier from **http://mail.google.com/mail/help/notifier/notifier_windows.html**. During the installation, check the box labelled 'Use for outgoing mail'. The setting won't show up in the Windows Internet Options dialog, but Gmail will still be configured as your default email service.

DO THIS... CHECK OTHER ACCOUNTS WITH GOOGLE MAIL

Google Mail's POP3 capabilities mean you can centralise all your email accounts. Configuring the feature is similar to adding a different 'Reply to:' address. Go to 'Settings > Accounts', then choose 'Add another mail account' in the 'Get mail from other accounts' section. Fill in the 'Enter the email address...' box with your old POP email address, then click 'Next'. Google Mail will try to add your POP server address and username fields by itself – you're responsible for entering your password. Make sure you check the username and POP server fields too, as Google Mail could get it wrong.

When you've finished tweaking these settings, click 'Add Account'. You'll be given the choice of sending mail from the new address you've set up too. To do this, you'll have to click through the wizard until you're prompted to send a verification email to your POP address. Once received, you can prove you're the legitimate account holder by logging into your old account and clicking on the confirmation link provided.

Endless disk space

Need cheap storage for your Web 2.0 extravaganza? It's Amazon to the rescue with its Simple Storage Service, *Simon Bisson* explains.

REQUIREMENTS

- **AMAZON WEB SERVICE ACCOUNT**
  This gives you the keys you need to work with Amazon's web services.
- **VISUAL STUDIO 2005 (OR VISUAL C# EXPRESS 2005)**
  C# development environment (though any web service capable language will do).

Buying infrastructure is expensive — especially when you need to invest in large amounts of storage. There's the cost of the disks, storage hardware, backups, even the expense of the data centre — and more importantly, you need to consider the cost of paying for the people you need to run it. Then there's the problem of deciding whether to buy all the storage you need at once, or add disks and servers piecemeal as demand increases.

Today's Web 2.0 world is storage-intensive. HP and IBM are selling hardware to help build the next-generation data centre, but buying your storage in multi-terabyte blocks can be a little demanding on a startup's cash flow — and impossible if you're just trying out an idea. You could use storage on ISP's web servers, but bandwidth costs quickly become prohibitive — especially if that little shareware or freeware project gets Slashdotted or ends up at the top of the Digg charts. Tens of dollars a month can suddenly become hundreds or even thousands, and your web site can be cut off if you pass your host's bandwidth limits.

So what can you do? How about taking advantage of the work that someone else has done? You can use their data centre, their infrastructure and their staff. Suddenly everything becomes a lot cheaper, as you're paying for just the data you store and bandwidth you use, as you use it, rather than handing over the big bucks upfront.

Software as a service has become a popular way of working, with companies such as salesforce.com selling access to complex applications on a per-user per-month basis. Infrastructure services have been around just as long, but pricing models made them suitable only for big businesses that were modernising data centres.

Amazon, however, hopes to set a new precedent. It's been building an e-commerce platform for a long time and has learnt many lessons about how to manage large-scale infrastructures — and how to deal with small applications running on its platforms. It's developed a series of tools and services that it sells to anyone who is in need of server or storage space — and at an extremely competitive price.

The Amazon web services platform, AWS, is made up of four key components. First there's S3, the Simple Storage Service. It's been joined by SimpleDB, an online database, EC2, the Elastic Compute Cloud server platform, and Simple Queue Service. The resulting combination is a readily available and low-cost source of computing and storage capability. You can use it to host your applications and servers, or just as storage that you link to from your own applications or web sites.

Backup without hardware costs using Amazon's S3 API.

STORE FOR LESS

This month we're going to focus on the Simple Storage Service, S3. Designed as a simple storage service that is able to handle any amount of data, it builds on the platform that Amazon uses for its massive e-commerce service. When you use S3, you're using exactly the same interfaces and storage hardware that Amazon's engineers use every day. If you were to

SPOTLIGHT ON... CLOUD DEVELOPMENT

Amazon's Web Services aren't the only internet-based development tools out there. While they're probably the most flexible, other platforms offer different ways of working. There's one thing they all have in common, though: they let you run your applications on the infrastructure of a successful internet business.

Google's App Engine is probably the closest in concept to AWS. Like Amazon's tools, it lets you develop applications that run on Google's servers. Unlike Amazon, however, you're currently limited to Python as the only supported language. Google has said it will be adding extra languages in future, though, and you do gain access to Google's internal services, including its BigTable database platform.

Salesforce.com has been releasing elements of its Force.com platforms over recent years. Starting with programmable forms and progressing to its development platform APEX, Salesforce.com has turned its online CRM platform into a tool for building your own business applications. Like Amazon, Salesforce.com enables you to manage workflows and build your applications into desktop applications using web services.

There's a lot to be said for hosting applications in the cloud: after all, it's not so very different from running a web site on a hosted server.

Amazon's web services have copious amounts of online documentation.

put together a system yourself that required the same level of 'uptime', you'd be pretty hard pressed to do it for what Amazon charges.

Using S3 is very cheap indeed. It's hard to buy individual hard disks for the price of an S3 account — let alone the rack space and the storage servers. Amazon provides an online calculator (**http://calculator.s3.amazonaws.com/calc5.html?**) to help you estimate your storage and bandwidth bills. Remember, you only pay for what's been used, but that can rack up if your site or application becomes popular.

S3 isn't complicated — it's called 'Simple Storage' for a very good reason. All you can do with it is store stuff, though that stuff can be any number of objects ranging in size from a few bytes to 5GB. Objects are stored in buckets, and these can be stored in either the US or Europe. There's no limitation on where buckets can be accessed from. The default download protocol is HTTP, so it's very easy to build into your applications, and if you're using it to distribute large files there's even support for BitTorrent to help keep download costs to a minimum. You can also use SOAP and RESTful APIs, which let you work with S3 from pretty much any development platform and most languages.

Amazon isn't just putting your files on the equivalent of a public web site — there's plenty of security to keep your files under your control. Developer keys are required for uploading and downloading, and you can apply per-user access rights to your stored objects, which can be made public or private.

So how do you use S3? The key is the first S — Simple. Amazon lets you use the languages you want and the protocols that you're familiar with.

First, you need to create a bucket for your data. This sets up the namespace you need to use for your objects. You need to use its URL every time you (or your users) want to work with the data. Don't be surprised if your chosen bucket name is unavailable — buckets are a global reference for S3 data and names can only be used once. The global nature of buckets also means that you're limited to 100 at a time. Still, that's not much of a limitation, as you can store an unlimited amount of data in each!

CHOOSING A PLATFORM

Amazon provides development samples for Java, C#, Perl and PHP. You'll find the first two most useful if you're planning on building desktop applications, while Perl and PHP work best with the web. A quick search will unveil third-party toolkits and libraries for most other development platforms, including the Web 2.0 favourites JavaScript and Ruby.

Once you've chosen your development platform, you'll need to generate your AWS secret key. This is used to authenticate your applications with the service and is linked to your AWS Access Key ID. Once you've signed up for AWS you'll find your secret key and your key ID on the AWS Access Indentifiers page of your account.

We're going to build a simple application in C# that will use familiar REST techniques to upload a file to S3, which we'll then be able to download using a web browser. Our code could be used as a back-up tool for critical files (such as your photographs or work documents) or as a tool for uploading the latest builds of a shareware or freeware application to S3, ready for distribution to the world.

You'll need to download Amazon's S3 Rest Library for C# from the AWS web site (**www.tinyurl.com/3q3jw5**). Once it's down, you can load the sample code into Visual Studio and write your own application, re-using a lot of Amazon's code.

BUCKETS OF DATA

You may not want to use a REST approach in

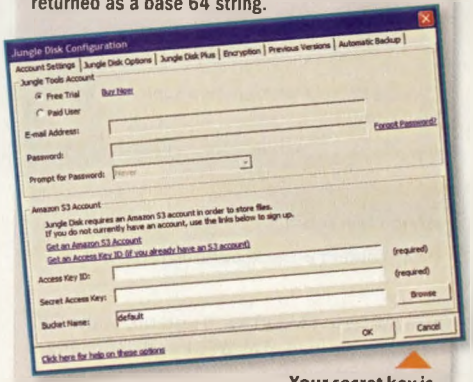
DO THIS... SIGN YOUR S3 REQUESTS

The S3 API requires all requests that add or change data stored on Amazon's servers to be signed, using a hash based on your secret API key. This is to stop anyone else changing your data, and to make sure that the right person is billed for data operations!

Creating a signature isn't easy: it requires some cryptographic manipulations to create the appropriate SHA1 hash. You'll need to include .NET's System.Security.Cryptography namespace to use its hashing functions:

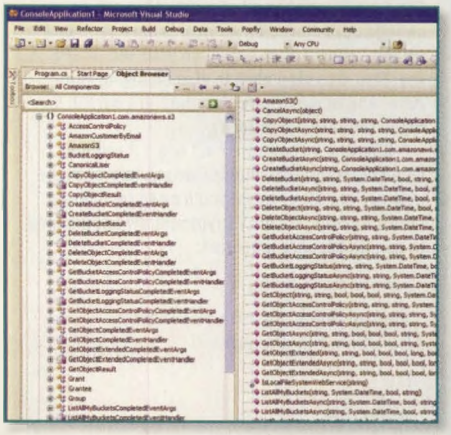
```
private static string
AwsGetSignature(string operation,
DateTime timeStamp)
{
string raw;
string signature;
UTF8Encoding encoding;
HMACSHA1 objHMACSHA1;
isoTimeStamp = timeStamp.
ToUniversalTime().ToString(
csISODateFormat, System. Globalization.
CultureInfo. InvariantCulture );
raw = "AmazonS3" + operation +
isoTimeStamp;
encoding = new UTF8Encoding();
objHMACSHA1 = new HMACSHA1(
encoding. GetBytes(YourAWSsecret key));
signature = Convert. ToBase64String(
objHMACSHA1. ComputeHash(encoding.
GetBytes( raw.ToCharArray() ) ) );
return signature;
}
```

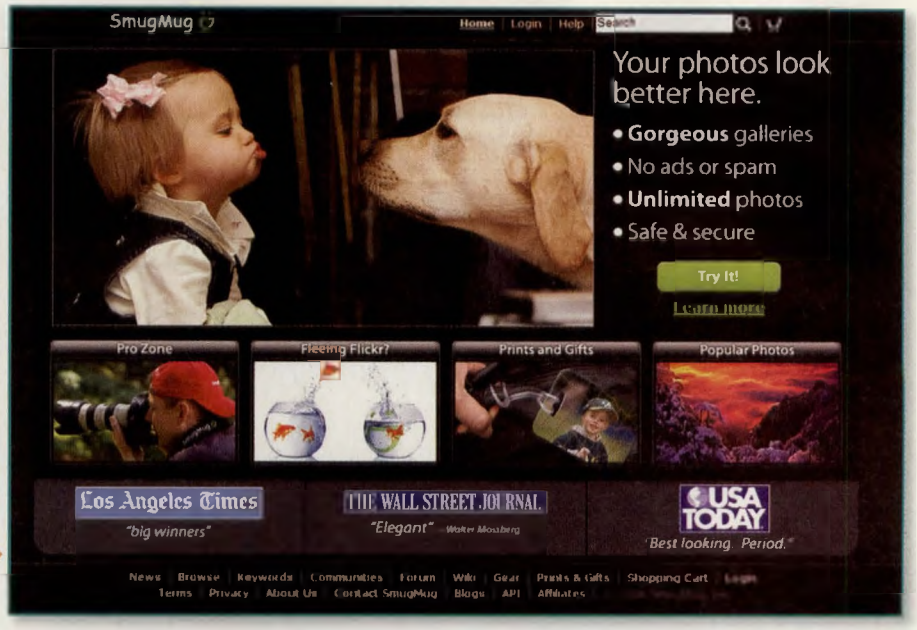
This code takes in a string describing the operation we're using on S3, along with the time stamp of the operation. The time is converted to an ISO format and then used to construct a string that contains the name of the Amazon service we're using, along with the operation type. This is converted to a binary format and then hashed with your secret key. The resulting signature is returned as a base 64 string.



Your secret key is essential for working with S3, even if you're using a tool such as Jungle Disk.

Visual Studio's Object browser makes it easy to extract the structure you'll need for calls to S3.





The CEO of photo storage site SmugMug says S3 has saved his company more than half a million dollars in infrastructure costs.

your applications, and AWS has implemented a SOAP API you can call directly from your code. To use the SOAP API, import a web reference to the S3 API into your C# project, using the WSDL Amazon publishes at **http://s3.amazonaws.com/doc/2006-03-01/AmazonS3.wsdl**. This exposes the method you need to create buckets and work with objects.

The following code snippet will upload a text file to S3 using the 'PutObjectInline' method. This method is best suited for small documents — up to 1MB in total. Larger objects will need to use S3's separate PutObject API.

We're working with a command line application, so we'll first make sure that we've got the right syntax before loading the file content into a string:

```
static void Main( string[] args )
{
DateTime now;
DateTime dateStamp;
if ( args.Length < 1 )
{
Console.WriteLine( "Syntax: S3upload filepath/filename." );
return;
}
string file = args[0];
string content = File.ReadAllText( file );
```

Once the file is loaded, we'll instantiate the S3 API object we loaded as WSDL and define the metadata for our file:

```
S3 service = new S3();
MetadataEntry[] metadata = new MetadataEntry[2];
metadata[0] = new MetadataEntry();
metadata[0].Name = "Content-Type";
metadata[0].Value = "text/plain";
metadata[1].Name = "Uploader";
metadata[1].Value = "APC";
```

Next, we'll create a signature for the file using a time stamp. S3 uses this to authorise the transfer (see 'Sign your S3 requests').

As we're uploading a text file, we'll also need to encode it for upload.

This approach can also be used to upload binary files to S3 servers:

```
now = DateTime.Now;
dateStamp = new DateTime(now. Year, now. Month, now.Day, now. Hour, now.Minute, now. Second, now.Millisecond, DateTimeKind. Local );
string signature = AWSGetSignature( "PutObject", datestamp );
byte[] data = UnicodeEncoding. ASCII.GetBytes( content );
```

Finally, we can proceed to upload the file to the S3 service. You must have created the bucket you'll be using in advance.

Include both your secret and standard keys. Once the file is stored, we can tell our users that it's been uploaded.

PutObjectInline's syntax is:

```
PutObjectInline(string Bucket, string Key, ConsoleApplication1.com.amazonaws. s3.MetadataEntry[] Metadata, byte[] Data, long ContentLength, ConsoleApplication1.com. amazonaws.s3.Grant[] AccessControlList, ConsoleApplication1.com. amazonaws. s3.StorageClass StorageClass, bool StorageClassSpecified, string AWSAccessKeyId, System.DateTime Timestamp, bool TimestampSpecified, string Signature, string Credential)
```

We can use this to construct our upload request, which will upload to a pre-defined Bucket, using the file parameters of the upload as a key with a standard storage class and no access control list — so anyone will be able to download the file (if they know the URL):

```
Console.WriteLine( "Starting to upload file..." );
service.PutObjectInline( "MyBucket", file, metadata, data, content.Length, null, StorageClass.STANDARD, true, YourAmazonKeyID, datestamp, true, signature, null );
Console.WriteLine( "File upload complete." );
}
```

S3 is really a flat file storage system. You can fake a hierarchy using keys, by encoding the directory name in the file key.

To download, all you need to do is make a simple HTTP request to the URL **http://MyBucket. s3.amazonaws.com/file** (where MyBucket is the name of the bucket you're using and file is the key you submitted when you uploaded your data). APC

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IT'S ALMOST A ROAD TEST
WE DRIVE HOLDEN'S MENTAL COUPE 60

CLARKSON! MAY! HAMMOND!

"MY PIN-UP'S ANGELINA JOLIE. OH, AND A TRAFFIC CONE..."

NEW MAGAZINE! OUT NOW!

Create 3D movies

Discover machinima and step into the world of computer generated movie making. *Jon Thompson* shows you how.

REQUIREMENTS

- **ANTICS 3D**
  This free, professional machinima production package is all you'll need to complete this tutorial: **www.antics3d.com/**

IN THIS SERIES

- **August '08**
  In part 1 of our machinima tutorial series, we introduce you to Antics 3D, the free, professional machinima production package, and show you how to create, light and dress a simple set.
- **September '08**
  We'll explore creating and directing the characters, dialogue and action for your movie.
- **October '08**
  We'll show you how to film the action, add sound and edit it into a finished work.

INSIDE INFO

- Archive 3D free object library: **http://archive3d.net/**
- Archive Textures is a free texture library run by the people behind Archive 3D: **http://archivetextures.net/**
- Web page containing links to several free object libraries: **www.amazing3d.com/modfree.shtml**
- Turbo Squid carries plenty of free objects and textures, as well as commercial offerings: **www.turbosquid.com**
- Find out more about the free Antics 3D Basepack here: **www.antics3d.com**

Machinima (a contraction of the words 'machine' and 'cinema') is all about creating, directing and shooting computer-generated movies entirely within your own computer without any expensive hardware. The technique has recently come of age, with dedicated packages providing everything you need to visualise, shoot and edit your ideas to produce a finished work.

There's already a large and growing online community of machinima makers using a variety of software. One such package is Antics 3D. Free to download, this, and a few good ideas, might be all you need to become the Stephen Spielberg of machinima.

GETTING STARTED

After installing the free Antics 3D Basepack, running it for the first time presents you with the environment in which you create sets, direct characters and record the action. At the top of the screen are all the controls for creating and manipulating everything, split into toolbars. On the left is the 'Set List', containing the elements used by the current set. Below this is the 'Project Bin' containing all the elements you've made available for possible use on the set. The rest of the screen contains the 3D set view. These windows are all docked in place, but grabbing their titles also allows you to rearrange them or to leave them floating.

Finding your way around the toolbars can be quite daunting at first, as can working out how to view the set from the angle you want. For more details on finding out what all the buttons do and how to move around the set efficiently please read 'Spotlight on... Learn the user interface' (at right).

FLOORS AND WALLS

Let's jump straight in by designing a simple set containing just one room. Every new Antics 3D project begins with a default 4 x 4m room on a very large grid representing the maximum potential size of the set. The default room area within the set is represented by a light blue square on the floor. Select this with the object selection tool. A black outline surrounds it. Delete it by hitting the 'Delete' key. Now right-click on the set grid and ensure 'Snap Position' is ticked.

We create new rooms using the 'Create Room' button on the 'Rooms' toolbar. Press this and on the 'Set View', you'll notice a small black blob under the mouse pointer, snapping to the grid. To create a new room, simply click where you want the corners to be. As you do so, Antics 3D draws out each edge of the room. At the bottom of the 'Set View' window is the length of the current room edge in metres. Clicking on the starting point again to create a fourth edge completes the room.

Start your project by creating a rectangular room 7m wide and 5m deep. A light blue room

When creating where the main action of your film will take place, you only need to dress those areas that will be seen by the camera.

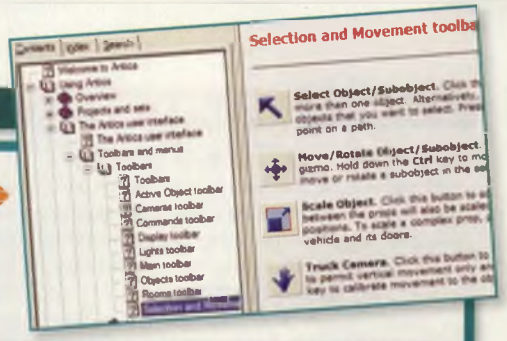
SPOTLIGHT ON... LEARN THE USER INTERFACE

Antics 3D contains several toolbars containing a wide range of tools for creating and editing sets, characters and cameras. Learning what all these buttons do is the key to getting the most from the package. The help system is comprehensive, but the information is buried in a large hierarchy of other help topics.

To find it, on the 'Help' menu, select 'Antics Help', then select the 'Contents' tab. Expand the 'Using Antics' tree. Along with further sub-trees, you'll see one called 'The Antics User Interface'. Expand this then expand the 'Toolbars and Menus' tree beneath it and finally select 'Toolbars'. Each toolbar has a page here, naming and describing its buttons.

In this initial machinima tutorial, we make heavy use of the 'Selection and Movement' toolbar, the room and wall creation buttons from the 'Rooms' toolbar, the 'Display Hidden Objects' button on the 'Display' toolbar and the 'Create Light' button on the 'Lights' toolbar.

The movement buttons enable you to view the set from any angle, but it's sometimes more efficient to adjust the shot using just the cursor keys. To the right is a handy table to help you learn what each cursor direction does.



Though hidden away, the online help system has a full description of all toolbar functions.

Cursor key	Basic function	With shift	With control
Left	Pan camera left	Rotate camera left	Zoom camera out
Right	Pan camera right	Rotate camera right	Zoom camera in
Up	Move camera in	Rotate camera down	Pan camera up
Down	Move camera out	Rotate camera up	Pan camera down

outline displays itself on the floor. To edit your room, simply select the 'Edit Room' button and drag the black corner markers to wherever you want them to be.

Next, let's add some walls. Ensure the room is selected, and press the 'Edit/Create Walls' button on the 'Rooms' toolbar. We'll call one of the long walls the back wall, and the two shorter walls the side ones. Click anywhere along the edge of the room to which you want to add a wall and a wall appears. For walls that aren't meant to occupy a complete edge to a room, you can also click and drag the cursor from the point on the edge where the wall should start to the point where it should stop. You can also delete a wall by selecting it and pressing delete.

Because all objects obscure what's behind them, you can hide things by selecting them, right-clicking and selecting 'Hide'. To display hidden objects again, press the 'Display Hidden Objects' button. This displays them as ghost images. You can then select them, press the right mouse button, and unhide them.

HANDY TIP

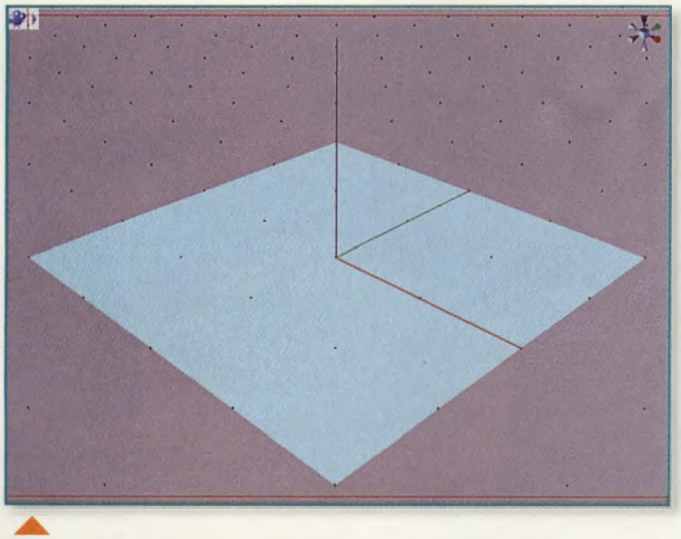
Always remember when creating sets that you need only add things that will be visible during the shots you subsequently direct. In some cases, you need only create and dress a small part of a room. If a character opens a door and enters from another room, for instance, you need only furnish the part of the other room that can be seen while the door is open.

ADDING TEXTURES

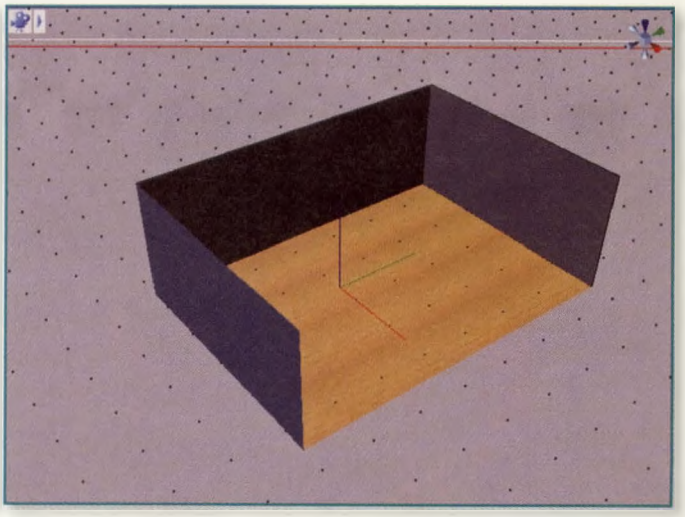
Let's now add a texture to the floor. From the 'View' menu, select the 'Content Viewer'. Under the 'Local Warehouse' tree are all the scene elements Antics 3D currently knows about, including textures. Select a wood texture and drag it to the 'Project Bin'.

Close the 'Content Viewer' and select the floor of the room. Right-click and select 'Textures'. A room can have four textures — the inner and outer (underside) surface, and the top and bottom of the ceiling, which we'll come to later. Double click 'No texture specified' on the 'Floor Inside' surface and select the wood texture you just added to the project. Press 'Okay' and apply the texture to see how it looks. If you're happy, dismiss the 'Object Properties' window.

Now select a wall, and do the same, this time double-clicking the crosshatched square for the 'Inside' surface. Select white as the colour and press 'OK'. The software creates and assigns the wall a texture called 'colour_wall_01_inside.ksh'. Don't worry if the wall doesn't appear white



The default starting room in the machinima package Antics 3D.



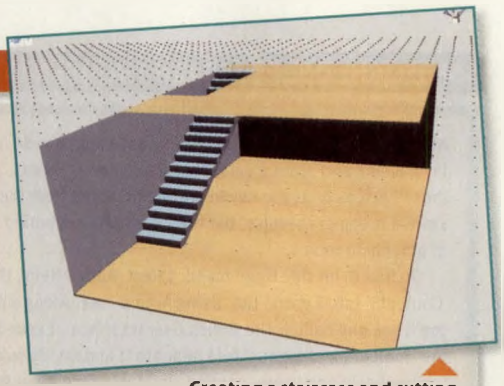
The bare set after a floor texture has been applied.

DO THIS... CREATE A FLIGHT OF STAIRS

First, select the 'Create/Edit Stairs' button. Then click and hold the left mouse button down on the area of the lower room where you want the staircase to begin. Drag the mouse pointer in the direction in which you want the stairs to climb. When you have enough stairs, release the button.

You can now precisely position and rotate the stairs to exactly where you want them using the 'Move/Rotate' tool. Create a second room and use the 'Move/Rotate' tool to elevate it to the top of the walls of the first, thereby forming a landing at the top of the stairs.

Select the staircase and open its 'Properties' window. There are two parameters we can use to control how it interacts with the upper floor. The first is the total number of stairs. Too few will leave a gap between the top step and the landing, whereas too many will continue the staircase above the landing. The second parameter is the length of the hole to cut in the landing, expressed in steps. In a normal staircase, the landing is usually open for most of the length of the staircase. Lowering this value will cause the stairs to cut a smaller hole in the ceiling.



Creating a staircase and cutting through the upper floor.

when you press 'apply'. Select each wall in turn and apply this texture to their inner sides just as you applied a texture to the floor. Using the same texture on all walls ensures that if we change the properties of the texture, all walls will change accordingly.

Remember the ceiling? It's not displayed by default. To see it, select the floor, right-click, and display its 'Properties'. On the 'General' tab, check the 'Show Ceiling' box and press 'Apply'.

DOORS AND WINDOWS

Now we'll add a window to the left wall, and a door to the back one. The online Antics 3D Warehouse contains everything we need. Open the 'Content Viewer' again, expand the Antics 3D 'Warehouse' tree and click on the web address it contains.

Much of the basic content in the warehouse is currently free to download. Click on 'Buildings', then on the 'Doors 01' content pack. Add this to your shopping cart then go back and do the same for the 'Windows 01' content pack. Go to the checkout and press 'Payment'. You'll be given a link to let you download the content.

The content pack files are executables, so click to install them. Once done, the 'Content Browser' should contain an extra section in the local warehouse called 'Buildings', containing doors and windows.

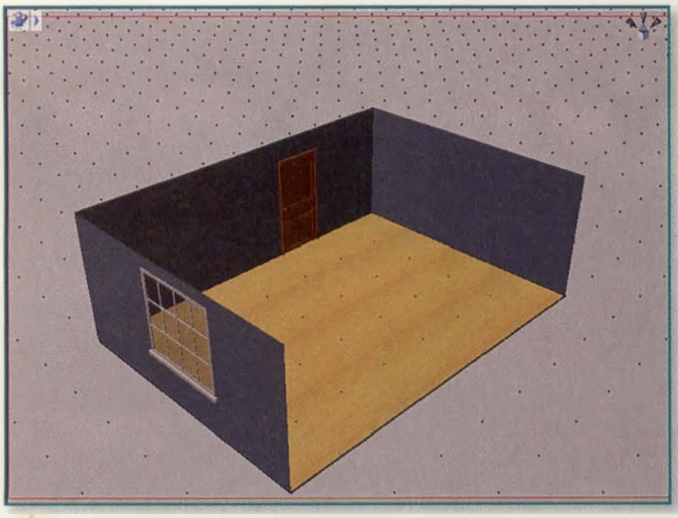
Drag a suitable door and window to the 'Project Bin'. Close the 'Content Browser' and open the 'Props' category in the 'Project Bin'. Drag the entry for the door onto the back wall of the set. It will align itself automatically to the wall. Do the same to create a window on the left wall.

Regardless of whether you create a light source, by default objects are illuminated by something called ambient light. This provides illumination even when there are no light sources present. You can change the ambient light colour and intensity by going to the set list, right-clicking the 'Set' top-level container, and selecting 'Properties'. You can set the ambient light colour to black to turn it off, in which case everything will appear somewhat darker against the backdrop.

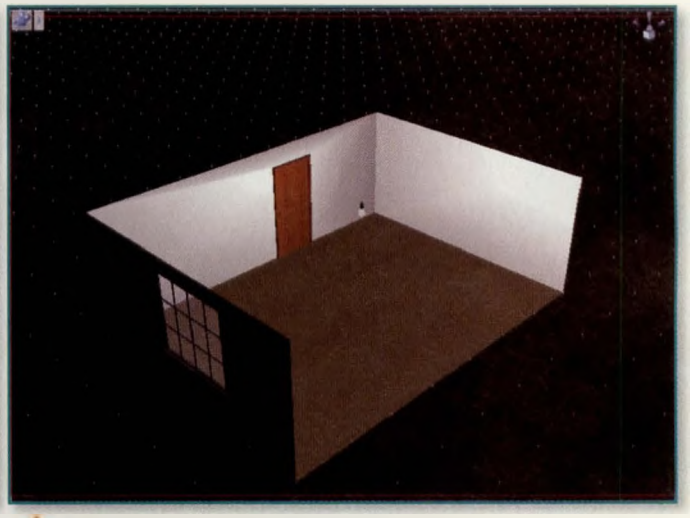
You add a light by selecting the 'New Light' button on the lighting toolbar. Moving the cursor over the set makes a red bull's-eye cling to the nearest surface. Place it in the middle of the floor and click to create the light. The set becomes illuminated and the walls appear white. While still selected, use the 'Move/Rotate' tool to elevate the light from the floor to ceiling level. You'll notice the lighting in the room change as you do so.

You can change the colour of the light and the parameters that dictate how it fades with distance by selecting it, right-clicking and selecting 'Properties'. On the 'Properties' window, along with a colour chooser, you'll find three attenuation parameters. The first controls the overall intensity of the light: the higher the value, the lower the wattage.

> YOU CAN CHANGE THE COLOUR OF THE LIGHT AND THE PARAMETERS THAT DICTATE HOW IT FADES WITH DISTANCE



The bare set after a window and door have been added.



The bare set, lit by a single light, with the ambient light set to black.

Our set, dressed with objects and textures downloaded for free from the archive available at the Antics 3D online content warehouse.

Antics' web site offers much more content available for download.

Linear attenuation dictates how the illuminating power of the light fades the further you are from its source. The quadratic parameter does the same, but fades faster with distance, helping to create natural, localised pools of light. The light's 'Properties' window also allows you to switch it on and off. In multi-light sets, this enables you to create a range of dynamic lighting conditions.

DRESSING THE SET

Using objects from the content packs available from the Antics 3D online warehouse, or imported from other sources, you can dress the set. Some of the content on the Antics 3D site is 'premium', meaning it costs money to download. Though remarkably cheap for what you get, there are alternatives to be found online, because Antics 3D can import objects and textures made in a range of modelling packages. See 'Do this... Import objects and textures' for details on doing this, and 'Inside info' for a selection of online object and texture libraries.

Dressing the set takes time, just as it does in real filmmaking. Getting exactly the right props and textures is an art, and you may spend quite a long time browsing online object and texture libraries to find what you want. If you're stuck for ideas when it comes to dressing a set, it's a good idea to take inspiration from things you find online.

HANDY TIP

Professional filmmakers routinely use machinima software to help communicate their ideas to producers. It's visually much more impressive than a simple storyboard can ever be. Here's an example, showing the conceptual visualisation for an antiperspirant advert alongside the finished work: *www.tinyurl.com/6g7wob*.

For instance, if you're creating a kitchen, try surfing to a few kitchen design companies to see what they put on show. If you're stuck for layouts to rooms or houses, seek out builders and view their online portfolios. Try going to a picture hosting service like Flickr.com and entering a few keywords to see what inspiring images it returns. The sky's the limit; just remember to leave space for your characters to move.

We've chosen to dress our set as a lounge/dining room with blue wallpaper. The lounge has two large sofas, a couple of pot plants, a plasma TV and video, and its own ceiling light. It also has a standard lamp in the corner with its own light source. The dining area has a bookcase, a table and four chairs, its own ceiling light and another standard lamp.

What we need next is some characters to populate and interact with the set. That's the subject of next month's tutorial. ADC

DO THIS... IMPORT OBJECTS AND TEXTURES

You can import objects in .3ds, .bvh, and .fbx formats, and there are plenty of free object libraries, like Archive3D, online.

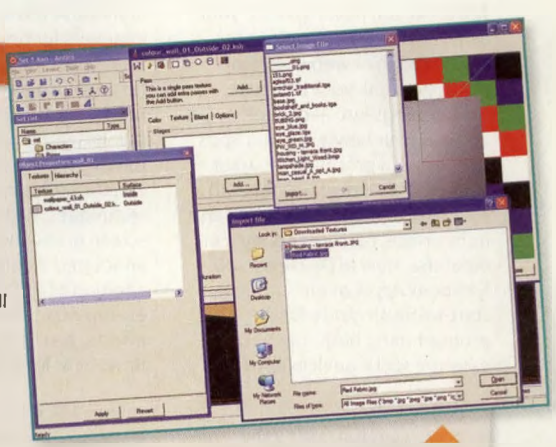
To import a downloaded model, unzip it (if necessary) and any associated textures. Now select 'Import' on the 'File' menu and select the model. An 'Options' window appears with two tabs.

Some models may be very big or small. You can scale them by hand afterwards, but selecting the option to set the height on the 'Options' tab is a good way of getting the size roughly right.

Clicking 'OK' will import the object. If its textures are missing, you'll receive one or more errors in the resulting import log window. Click 'OK' to dismiss this. You can now scale the object, position it and access its 'Properties' to apply new textures.

Importing a downloaded texture is a little more involved. First, right-click and select 'Textures' for a target object. In the resulting window, right-click the texture entry to which you want to apply the imported texture and select the 'Edit' option. If no texture already applies, this will say 'New' and selecting it will ask you to name it.

A larger window now appears. Select the 'Texture' tab, and in the 'Stages' section, press 'Add'. On the resulting pop-up, press 'Import' and select the texture file. After applying the texture, it'll also be available to other objects within the project.



Importing downloaded textures is slightly involved, but worth it.

downtime

HIGH-PERFORMANCE PLAYTIME

How to Do Everything: Facebook Applications

Here's your chance to get in on the Facebook act. This book will show you how to create your own Facebook applications for a wide range of web uses. Find out how to link your own web sites or blogs into Facebook pages and use your newly created apps to help sell a product or market a business or cause online. With coverage of the Facebook API and its interface, parsers and MySQL database. *How to Do Everything: Facebook Applications* is a clear, start-to-finish guide for the programming beginner or the extreme social geek in all of us.

CONTACT McGraw Hill
ISBN 9780071549677
PRICE $32.95
VERDICT ★★★★☆

Adobe Flash CS3 Professional Bible

Well, we all know how great Adobe software can be, and how unintuitive it is as well. Flash is infamous for being a frustrating and time-consuming piece of software for anyone new to the program. The Adobe Flash CS3 Pro Bible eases the pain of learning Flash with easy-to-follow, step-by-step guides, leading you through a maze of time-saving techniques. With the aid of large screen grabs and plenty of annotated diagrams, plus the addition of a CD-ROM packed with example exercises and custom effects, you'll be a Flash Guru in no time. Or at least in a few weeks.

CONTACT Wiley
ISBN www.wiley.com.au
PRICE $64.95
VERDICT ★★★½☆

BlueAnt Supertooth III

This Bluetooth hands-free is the shiznit. It clips to your sun visor and connects to your phone via Bluetooth. But the cool part is its text-to-speech technology. When someone calls, it says "Debbie calling" and then you can "accept call" just by speaking to it. It works remarkably well. However, it is a bit disconcerting when you get into a freezing cold car late at night and it blurts out "Supertooth connected" — made us jump a few times. It works with the Apple iPhone 3G, too, which gives it reality-distortion-field pulling power.

CONTACT BlueAnt
ONLINE www.blueant.com.au
PRICE $149
VERDICT ★★★★☆

DLO Portable Speakers for iPhone

The iPhone is here and so are the accessories. These compact and portable speakers have been specifically designed for use with the iPhone to allow for clear stereo sound without mobile phone interference. The removable, rotating stand holds the iPhone upright or horizontally for the ideal portable movie-viewing experience with the ability to turn your iPhone into a speaker phone whenever you get a call. For easy portablility both speakers snap neatly into the base to create a ball approximately 6in in diameter. And for around $50, this is good sound at a great price.

CONTACT DLO
ONLINE www.dlo.com
PRICE $50
VERDICT ★★★★½

Swann Flashlight DVR with Nightvision

Just imagine being able to capture those poorly lit moments in life with single-handed ease. To aid the security industry, Swann has released a high-powered flashlight with an in-built digital video camera, including sound. The Flashlight DVR has a built-in LCD screen, 128MB of built-in memory and supports mini-SD cards for extra video storage. It also includes three levels of brightness and IR sensors for seriously cool night-vision capability. This is ideal for security applications where discreet and easy video recording may be necessary to nab the bad guys.

CONTACT Swann
ONLINE www.swann.com.au
PRICE $425
VERDICT ★★★★☆

Lowepro Nova AW series bags

If you've just gone out and bought yourself a new DSLR, you're going to want to keep it safe in one of these swanky new Nova bags from Lowepro. The AW series offer a large central compartment with movable dividers constructed of soft protective material specifically produced to protect sensitive digital equipment. A front access pocket provides safe and accessible storage for batteries, small accessories and other bits and bobs. Slip-resistant straps and weather protection makes this the must-have camera bag for beginners and pros alike.

CONTACT Lowepro
ONLINE www.maxwell.com.au
PRICE $69-$149
VERDICT ★★★½☆

Blu-ray: The Spiderwick Chronicles

Oh man! What do you mean this is a kid's movie?! This is way too freaky to be a kid's film. What with goblins slashing people and bloody toothmarks appearing on people's legs, this can't be just for kids: it's a film for the whole family. This is a good excuse to whack on a Blu-ray film with heaps of great CGI and stare at it in peace while the kids sit on the sofa beside you, quietly crapping their pants. The story's not bad and the action and dialogue is surprisingly uncheesy. So go on, spoil the kids... and yourself, by giving this impressive fantasy tale a romp. We dare you!

CONTACT Paramount Pictures
ONLINE www.paramount.com.au
PRICE $42.83
VERDICT ★★★★☆

Blu-ray: I am Legend

The ever-cool Will Smith is the last man left alive on Earth after a mysterious disease inexplicably wipes out all of humanity, except him. Smith puts in a great performance as a lonely scientist who struggles to hold onto his sanity as he battles through his daily 'routine' of looking for a cure for the plague in a wild and delapidated New York city. Great visual effects and eerily shot scenes add believability to a well-written script which delivers a fulfilling movie experience, especially as the action climaxes with the revelation explaining the film's title. Brilliant!

CONTACT Roadshow Pictures
ONLINE www.roadshow.com.au
PRICE $49.83
VERDICT ★★★★½

Wii Fit

42: the meaning of life (and *Peter Dockrill's* Wii Fitness age).

Video games get a bad rap, don't they? If it's not condemnations and controversies over violence and graphic content, then it's the claim that players lead an unhealthy life sitting glued to the screen. Wii Fit turns the latter criticism on its head by reimagining the video game as a dedicated exercise/lifestyle product (with a digital personal trainer to boot). It's a bold concept, and for the most part Wii Fit is a success. For your $150 you get the game disc with the Wii Balance Board — a reassuringly sturdy and sensitive standalone peripheral that you stand/balance on to control the various games and exercises. Wii Fit assesses your weight, BMI, centre of gravity and posture to give you a 'Wii Fitness age' and helps you to set a fitness goal for yourself. You are then encouraged to 'train' across 40 different exercises in four central categories: aerobics, balance, muscle and yoga. All the games are fairly simple but they're fun, and together they add up to an enjoyably challenging low-impact workout. Whether it's worth the cash for most of us will ultimately depend on whether other Wii games can successfully utilise the Board.

AVAILABLE PLATFORMS: PC-DVD | **Wii** | PS 3 | PSP | XBOX 360 | DS

CONTACT	Nintendo
ONLINE	www.nintendo.com.au
PRICE	$149.95
✓	Innovative; fun; promotes health and exercise.
✗	Pricey; question of longevity.
VERDICT	★★★★☆

Mass Effect

Troy Coleman boldly goes.

PC gamers have had a long and tedious wait for Mass Effect, but we've been rewarded with a more refined and smoother game than the 360 version. Create and customise a personal Commander Shepard (you) and choose from one of six class specialities: combat, tech, biotics and three hybrid blends. Entering the galaxy it's not long before Shepard learns of a member of the elite Special Forces group, the Spectres, has gone rogue. Shepard, along with a couple of side kicks — which have varying degrees of combat, tech or biotic specialities — is quested with chasing him around the galaxy in his ship, the frigate SSV Normandy, and ending his shenanigans. Mass Effect is very much a story-driven experience, speaking to characters progresses not only the main story arc but opens up side quests that usually involve collecting objects or killing people. The dialogue definitely outweighs the action, which is OK, since, though better than the 360 version, it often feels a little clunky. Essentially needing to pause the game in order to initiate squad commands and organise inventory can become unwieldy and gelatinise play fluidity. That aside, boldly zinging through the galaxy is still a lot of fun and there's definitely plenty of content here to keep any would-be star commander happy for a long time.

AVAILABLE PLATFORMS: **PC-DVD** | Wii | PS 3 | PSP | XBOX 360 | DS

CONTACT	EA
ONLINE	masseffect.bioware.com
PRICE	$89.95
✓	Plot; characterisation; game length.
✗	Combat; inventory systems still feel clunky.
VERDICT	★★★★☆

Metal Gear Solid 4: Guns of the Patriots

Troy Coleman is an Old Snake in the grass.

AVAILABLE PLATFORMS: PC-DVD | Wii | **PS 3** | PSP | XBOX 360 | DS

CONTACT	Atari
ONLINE	www.konami.jp/mgs4/en/
PRICE	$109.95
✓	Innovation; immersive; beautifully cinematic.
✗	Long cut scenes and load times.
VERDICT	★★★★½

Old Snake: truly a dapper fellow.

From the first minute — ok, after the initial 20-minute intro movie — of MGS4, players are thrust headlong not only into an incredibly immersive third-person stealth epic, but also into the mind of developer Hideo Kojima. Blurring the distinction between interactive media and cinema, the 19 hours it took us to get to the closing credits felt like visiting an art gallery in the war-torn Middle East. As incredibly cinematic and well-directed as it is, MGS4 is heavy on the cut scenes — some bloating to well over an hour with a HDD install thrown into the mix — and heavier on the dialogue. There is a lot of information to process on the way toward Old Snake (our protagonist) finally completing his mission of taking out Liquid Ocelot. There's also a great deal of variety in terms of play. Checkpoint-driven levels are designed such that multiple avenues and means of progression are available. A small arsenal, high-tech gadgetry, cigarettes and porn are all available and valid means to a sticky end. A pretty steep learning curve for the new initiate — with some less-than-perfect, tough-to-master controls — is a smear on what is otherwise a thoroughly engaging, terrifyingly beautiful and truly memorable gaming experience.

Age of Conan: Hyborian Adventures

Troy Coleman plunges into the world of barbarians, boobs and blood.

With AoC, players enter the stunning (at least for a grunty machine) world of Hyboria aboard a slave ship; choose from one of three races then one of twelve classes split between four main archetypes of Rogue, Priest, Mage and Soldier. Once the novelty of taking off a character's top to see some perky boobs has worn off, it's more or less the same as other MMOs. Build a character's level and abilities by performing menial tasks for loot-based rewards, which usually involve killing/collecting/escorting/visiting (x number of) beasts/objects/people/locations. AoC manages to make this more rewarding, at least for combat aspects, by discarding the usual mash-mash and auto-attack combat, opting instead for real-time combination based combat. Fun and incredibly violent, smearing the landscape with a trail of blood is a lot of fun. Performance and playability has been a huge issue since launch. Rated for mature audiences, though the community doesn't always reflect this, AoC is a decent romp and stomp while we wait for the next big thing.

AVAILABLE PLATFORMS: PC-DVD

CONTACT EA Games
ONLINE www.ageofconan.com
PRICE $69.95

✔ Combat.

✖ Buggy; lack of high-level content.

VERDICT ★★★☆☆

Boom Blox

Peter Dockrill admires Spielberg's balancing act.

It's not every day that a visionary filmmaker teams together with a games developer to announce an original concept game, so when Steven Spielberg and EA did just that, expectations were high. Given the pedigree and CV of the talent involved, there was surprise in some circles when it was revealed that the first title (of a rumoured three) would be a 3D block puzzle game, but Boom Blox does possess a certain magical can't-put-it-down quality that separates it from other contemporary puzzle releases. In what is essentially an animated, rotatable, cartoony Jenga clone, your task is to blow up and demolish balanced blocks in a variety of ways. Different sorts of blocks have different properties, and you can interact with them in lots of different ways — in short, it's like a lot of other block puzzle games, but the polish of the execution here can't be argued with. Unleashing shots at the blocks is performed with a satisfying whip of the Wii Remote, while grabbing and extracting blocks from a wobbly tower is nail-biting. And just because it's simple doesn't mean it's limited; over 300 levels, plus heaps of unlockable content, multiplayer and a level creator should be more than enough to keep anyone busy. Boom.

AVAILABLE PLATFORMS: Wii

CONTACT EA Games
ONLINE www.electronicarts.com.au
PRICE $79.95

✔ Fun, simple and addictive.

✖ It's a puzzle game involving blocks.

VERDICT ★★★★☆

Race Driver: GRID

Always coming from the back of the pack: *Troy Coleman*.

A somewhat successor to TOCA and running on the Colin McRae: DIRT engine, GRID is an aggressive, unrelenting and action-packed arcade racer. Racing is split between two categories, Race Day and Grid World. Race Day is the place to go for a quick race, select from any of the locations, disciplines and vehicles and get busy. Grid World is the main racing portal: begin a career driving for another team, make a name and a wad of cash then branch out and establish your own team. When set up, enter into the regular season which is spread across three continents, each with its own unique racing style. Out on the track it doesn't take long to realise two things: GRID looks fantastic and the racing is bloody hard. Even on the easiest of the five difficulty levels it can be tough to get a podium finish, let alone win. Other vehicles often end up in the wall or off the track but usually miraculously recover, unlike our fiery wrecks. When everything gets too out of control, GRID has a flashback feature which is essentially time travel — hit the button and transport back to a spot just before the pile up on turn three. Multiplayer is also supported via system link or through Xbox Live. In comparison to the Forzas and the GTs of the world, there might not be enough in GRID for the foam-at-the-mouth-racing-fanboy, but it's definitely worth a lap or two around the track.

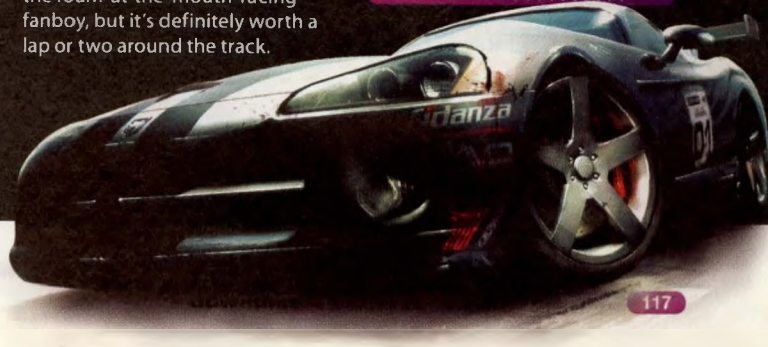
AVAILABLE PLATFORMS: PC-DVD, PS3, XBOX 360, NINTENDO DS

CONTACT Atari
ONLINE au.playstation.com
PRICE $69.95

✔ Fast; aggressive racing.

✖ Demanding AI.

VERDICT ★★★★☆



chip chat

by Peter Dockrill

Around the world in freighty ways

Now what have we here? Well, what could have been the birth of a bold, exciting new art form turned out to be nothing more than a fanciful prank, albeit one executed with impressive guile. Swedish artist Erik Nordenenkar wowed the collective internet when he published this stunning self-portrait created entirely, or so he maintained, from his GPS-tracked briefcase's movements around the globe (organised in conjunction with and freighted by shipping company DHL). Well, as it was subsequently discovered, the artwork was naught but a cunning ruse (and as one commentator pointed out, just how was he going to convince DHL to perform pretty loop-de-loops in the middle of the Indian Ocean anyhow?). Still, this one definitely wins *APC*'s 'Con of the Month' award. Check the rest at **http://biggestdrawingintheworld.com**.

I've been everywhere man? (Turns out that he hadn't.)

END OF AN ERA

Well, it had to happen. After some thirty-three years in the game, William H. Gates ('Bill' to his end users), the third-richest man in the world and (let's face it) the most successful geek ever, stepped down from his day-to-day role at Microsoft to focus on his philanthropic work. He'll still be involved at a senior level of course, but this gesture represents Bill's greatest step away from the company he co-founded in 1975 and brings the world closer than ever before to the concept of a post-Gates Microsoft. Love him or hate him, you can't help but marvel at the empire that Bill built (and the changes his empire brought to the world). In case you're wondering what Bill's last day was like, it might have gone a little something like this: *http://tinyurl.com/2mwy64*.

Happy Birthday Spam

109 years young today!!!

1899. It was a hell of a year. The leaders of the six Australian colonies met up to discuss Federation. The first woman executed by means of electric chair met her end in New York. And who could forget the patents on the aspirin and the paperclip, not to mention the start of the Second Boer War and the founding of football club AC Milan? And, *of course*, 1899 saw the first spam emails being sent. As this pic clearly shows (sent in by reader Ricky Kurniawan of Melbourne, Vic), spam has been clogging users' inboxes since your granddad's granddad's day. Or, perhaps, as Ricky points out, it's nothing but a 'good *old-fashioned* glitch...' Yuk yuk yuk. apc

Spam: when *wasn't* it a problem?

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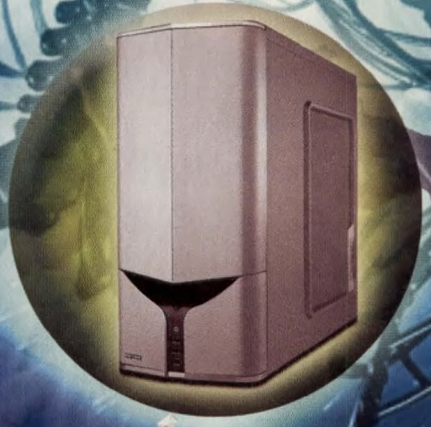

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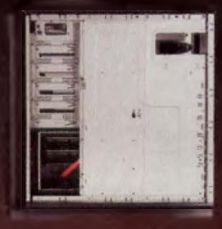

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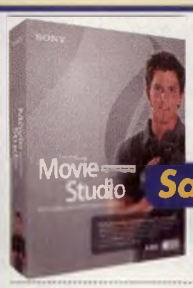

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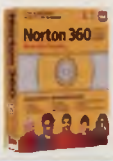

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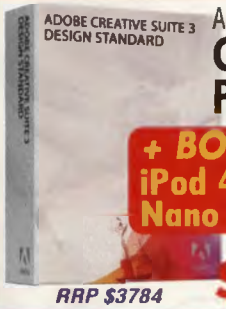

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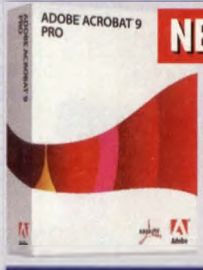

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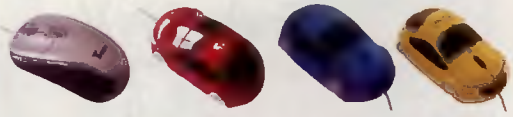

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USB to IDE 2.5"/3.5" SATA Cable
$24.00 PH-USBTOIDE-3

Panasonic Thermal Film

Model	Genuine	TONNY
KX-FA54E	$ 49.00	$ 18.00
KX-FA55A	$ 49.00	$ 19.00
KX-FA57E	$ 57.00	$ 15.00
KX-FA134	$ 82.00	$ 35.00
KX-FA135	$ 58.00	-
KX-FA136	$ 63.00	$ 26.00
KX-FA137	$ 75.00	-

Ricoh Laser Toner

Model	Genuine	TONNY
Type 30	$ 131.00	$ 59.00
Type 70	$ 140.00	$ 78.00
Type 150	$ 140.00	$ 74.00
Type 1435	$ 158.00	$ 83.00

Sharp Thermal Fax Rolls

Model	Genuine	TONNY
FO-3CR	$ 31.00	$ 16.00
FO-6CR	$ 24.00	$ 18.00
FO-9CR	$ 30.00	$ 18.00
FO-15CR	$ 44.00	$ 21.00

Lexmark Toner Cartridges

Model	Genuine	TONNY
Optra E/E+	$ 105.00	$ 61.00
E120	$ 94.00	$ 62.00
E210	$ 123.00	$ 59.00
X215	$ 90.00	$ 49.00
E220	$ 142.00	$ 79.00
E230/232/330/332	$ 97.00	$ 67.00

Model	Genuine	TONNY
E240	$ 94.00	$ 67.00
E250	$ 128.00	$ 74.00
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E320/322	$ 131.00	$ 82.00
E321/323 3k	$ 118.00	$ 85.00

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Epson Ink Cartridges

Model	Genuine	TONNY
T028	$ 41.00	$ 5.00
T029	$ 37.00	$ 7.50
T038	$ 20.00	$ 5.00
T039	$ 27.00	$ 7.50
T0461	$ 22.00	$ 4.50
T0472/3/4	$ 16.00	$ 4.50
T0491/2/3	$ 21.00	$ 4.50
T0494/5/6	$ 21.00	$ 4.50
T0621	$ 22.00	$ 6.80
T0631	$ 17.00	$ 6.80
T0632/3/4	$ 16.00	$ 6.80
T0731	$ 17.00	$ 7.40
T0732/3/4	$ 17.00	$ 7.40
T0811/2/3	$ 27.00	$ 8.40
T0814/5/6	$ 27.00	$ 8.40
S020089 / T052	$ 34.00	$ 5.30
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T557	$ 36.00	$ 20.50
T0561/2/3/4	$ 17.00	$ 6.80
T0751/2/3/4	$ 14.00	$ 6.80
T0591/2/3/4	$ 24.00	$ 8.40

Lexmark Ink Cartridges

Model	Genuine	TONNY
18C0781A (#1)	$ 28.00	-
13400HC	$ 43.00	$ 18.00
13619HC	$ 43.00	$ 28.00
10N0016 (#16)	$ 36.00	$ 21.00
15M0120 (#20)	$ 44.00	$ 24.00
10N0026 (#26)	$ 39.00	$ 23.00
18C0031 (#31)	$ 36.00	$ 25.00
18C0032 (#32)	$ 26.00	$ 20.00
18C0033 (#33)	$ 31.00	$ 22.00
18C0034 (#34)	$ 31.00	$ 25.00
18C0035 (#35)	$ 36.00	$ 27.00
12A1970 (#70)	$ 38.00	$ 21.00
12A1980 (#80)	$ 45.00	$ 22.50
18L0032 (#82)	$ 36.00	$ 25.00
18L0042 (#83)	$ 43.00	$ 23.00

Brother Ink Cartridges

Model	Genuine	TONNY
LC-37BK	$ 23.00	$ 5.00
LC-37C/M/Y	$ 37.00	$ 6.50
LC-47BK	$ 30.00	$ 5.00
LC-47C/M/Y	$ 19.00	$ 6.50
LC-57BK	$ 30.00	$ 5.00
LC-57C/M/Y	$ 19.00	$ 6.50
LC-800BK	$ 30.00	$ 5.00
LC-800C/M/Y	$ 19.00	$ 6.50

HP Toner Cartridges

Model	Genuine	TONNY
Q2612A	$ 90.00	$ 45.00
Q2613A	$ 92.00	$ 49.00
Q2613X	$ 110.00	$ 55.00
C7115A	$ 81.00	$ 45.00
C7115X	$ 97.00	$ 49.00
Q7516A	$ 215.00	$ 110.00
Q5949A	$ 92.00	$ 49.00
Q5949X	$ 155.00	$ 55.00
Q7551A	$ 154.00	$ 71.00
Q7551X	$ 253.00	$ 76.00
Q7553A	$ 102.00	$ 61.00
Q7553X	$ 175.00	$ 66.00
CB435A	$ 82.00	$ 61.00
CB436A	$ 92.00	$ 65.00
C8061X	$ 152.00	$ 65.00
C4092A	$ 79.00	$ 45.00
C4096A	$ 123.00	$ 59.00
92298A	$ 129.00	$ 59.00
Q3960A/C9700A	$ 104.00	$ 76.00
Q3961A/C9701A	$ 122.00	$ 76.00
Q3962A/C9702A	$ 122.00	$ 76.00
Q3963A/C9703A	$ 122.00	$ 76.00
Q6000A	$ 97.00	$ 84.00
Q6001/2/3A	$ 104.00	$ 86.00
Q7560A	$ 159.00	$ 113.00
Q7561/2/3A	$ 154.00	$ 113.00

Toner powder also available for HP & Samsung from $14.90

Brother Toner Cartridges

Model	Genuine	TONNY
TN-2025	$ 74.00	$ 49.00
DR-2025	$ 123.00	$ 65.00
TN-2150	$ 79.00	$ 51.00
TN-3185	$ 105.00	$ 59.00
DR-3115	$ 187.00	$ 73.00
TN-7600	$ 99.00	$ 59.00
DR-7000	$ 172.00	$ 73.00
TN-8000	$ 48.00	$ 23.00
DR-8000	$ 199.00	$ 83.00
TN-04BK	$ 195.00	$ 99.00
TN-04C/C/Y	$ 195.00	$ 99.00

Canon Toner Cartridges

Model	Genuine	TONNY
CART 303	$ 89.00	$ 45.00
CART 308	$ 89.00	$ 49.00
CART 308 II	$ 158.00	$ 55.00
CART 309	$ 239.00	$112.00
CART 310	$ 143.00	$ 59.00
EP-22	$ 75.00	$ 45.00
EP-25	$ 82.00	$ 45.00
FX-9	$ 115.00	$ 49.00
CARTN	$ 216.00	$ 59.00
CARTU	$ 105.00	$ 45.00
CARTW	$ 141.00	$ 45.00
E-31	$ 159.00	$ 55.00

Canon Ink Cartridges

Model	Genuine	TONNY
BC-02	$ 39.00	$ 21.00
BC-03	$ 35.00	$ 22.00
BX-3	$ 40.00	$ 22.00
BX-20	$ 49.00	$ 20.00
BC-05	$ 47.00	$ 25.00
BC-20	$ 47.00	$ 22.00
PG-40	$ 34.00	$ 24.00
CL-41	$ 35.00	$ 24.50
PG-50	$ 42.00	$ 27.00
CL-51	$ 45.00	$ 32.00
CL-52	$ 38.00	-
BCI-3eBK	$ 19.00	$ 6.40
BCI-3eC/M/Y	$ 17.00	$ 5.70
BCI-6BK	$ 22.00	$ 5.70
BCI-6C/M/Y	$ 22.00	$ 5.70
BCI-6PC/PM	$ 22.00	$ 5.70
BCI-6G/R	$ 22.00	$ 5.70
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CLI-8C/M/Y with chip	$ 22.50	$ 9.80
CLI-8PC/PM with chip	$ 22.50	-
CLI-8G/R with chip	$ 22.50	-
PGI-5BK with chip	$ 22.50	$ 9.80
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CLI-8C/M/Y no chip	-	$ 5.70
CLI-8PC/PM no chip	-	$ 5.70
PGI-5BK no chip	-	$ 5.70
BCI-15BK	$ 24.00	$ 6.10
BCI-15C	$ 39.00	$ 6.30
BCI-16C	$ 39.00	$ 6.30
BCI-24BK	$ 14.00	$ 5.60
BCI-24C	$ 31.00	$ 6.90

NEW! Canon Models

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HP Ink Cartridges

Model	Genuine	TONNY
C8721WA (#02BK)	$ 26.00	$ 11.00
C8771/2/3/4/5WA (#02C/M/Y/LC/LM)	$ 16.00	$ 10.00
C4844A (#10BK)	$ 42.00	$ 14.00
C4841/2/3AA(#10C/M/Y)	$ 42.00	$ 14.00
C4836/7/8AA(#11C/M/Y)	$ 42.00	$ 14.00
C5011D (#14 BK)	$ 33.00	$ 16.00
C5010D (#14 C)	$ 42.00	$ 16.00
C6615DA(#15)	$ 37.00	$ 22.00
C9351AA (#21)	$ 23.00	$ 16.00
C9352AA (#22)	$ 25.00	$ 21.00
CC630AA (#21 & #22 Combo)	$ 37.00	-
C8727AA(#27)	$ 26.00	$ 16.00
C8728AA (#28)	$ 30.00	$ 22.00
Y2016AA (#27 &#28 Combo)	$ 42.00	-
51645AA (#45)	$ 39.00	$ 16.00
Y2017AA (#56 & #57 Combo)	$ 56.00	-
C6656AA (#56)	$ 28.00	$ 17.00
C6657AA (#57)	$ 43.00	$ 23.00
C6658AA (#58)	$ 33.00	$ 23.00
CB336WA(#74XL)	$ 40.00	$ 28.00
CB338WA (#75XL)	$ 43.00	$ 30.00
C8765WA(#94)	$ 28.00	$ 18.00
C8766WA(#95)	$ 33.00	$ 20.00
C8767WA (#96)	$ 40.00	$ 20.00
C9363WA(#97)	$ 43.00	$ 18.00
C9364WA (#98)	$ 25.00	$ 20.00

Samsung Laser Toner

Model	Genuine	TONNY
SCX-4100D3	$ 101.00	$ 49.00
SCX-4216D3	$ 101.00	$ 49.00
SCX-D4200A	$ 106.00	$ 49.00
SCX-4521D3	$ 106.00	$ 49.00
SCX-D4725A	$ 106.00	$ 64.00
SCX-5312D6	$ 97.00	$ 70.00
SF-5100D3	$ 95.00	$ 49.00
ML-1210D3	$ 101.00	$ 49.00
ML-1610D2	$ 101.00	$ 49.00
ML-D1630A	$ 107.00	$ 74.00
ML-1650D8	$ 188.00	$ 92.00
MLT-D108S	$ 80.00	-
ML-D3050B	$ 226.00	$ 86.00
ML-1710D3	$ 101.00	$ 49.00
ML-2010D3	$ 101.00	$ 49.00
ML-2150D8	$ 188.00	$ 89.00
ML-2250D5	$ 125.00	$ 68.00
CLP-300A BK	$ 89.00	$ 41.00
CLP-300A C/M/Y	$ 79.00	$ 39.00
CLP-500/550D7 BK	$ 145.00	$ 98.00
CLP-500/550D5 C/M/Y	$ 156.00	$101.00
CLP-510D7 BK	$ 147.00	$101.00
CLP-510D5 C/M/Y	$ 156.00	$101.00
CLP-600A BK	$ 121.00	$113.00
CLP-600A C/M/Y	$ 169.00	$117.00

Konica Minolta Color Laser Toner

Model	Genuine	TONNY
QMS Magicolor 2200/2210 BK	$ 147.00	$ 107.00
QMS Magicolor 2200/2210 C/M/Y	$ 269.00	$ 130.00
QMS Magicolor 2300/2350 BK	$ 129.00	$ 69.00
QMS Magicolor 2300/2350 C/M/Y	$ 192.00	$ 69.00

Model	Genuine	TONNY
QMS Magicolor 2400W/2430DL/2450 BK	$ 130.00	$ 85.00
QMS Magicolor 2400W/2430DL/2450 C/M/Y	$ 193.00	$ 85.00
QMS Magicolor 3300 BK	$ 89.00	$ 86.00
QMS Magicolor 3300 C/M/Y	$ 251.00	$ 119.00

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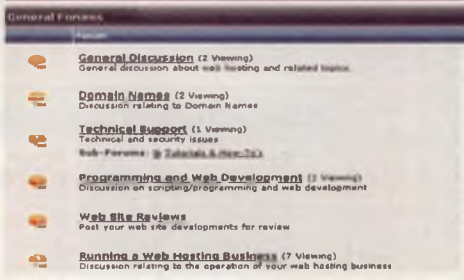

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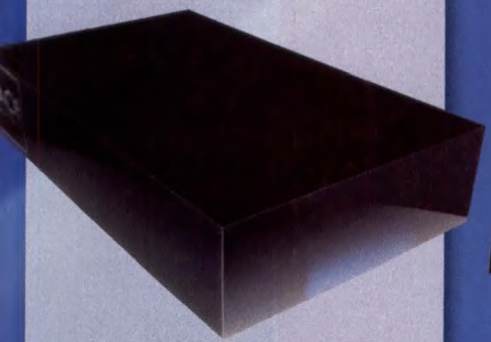

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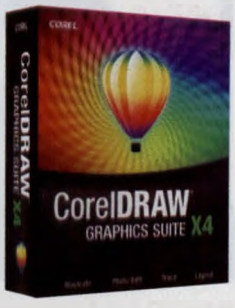

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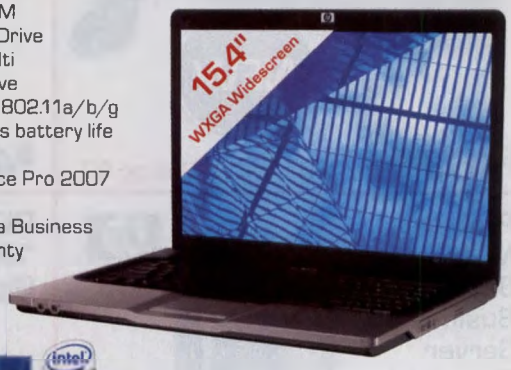

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EXCLUSIVE

$1799 | V7163 | RENT $16.98/wk*

*For terms and conditions, including RentSmart, see page 20. *Available capacity of hard drive may be less due to preinstalled software.

EXCLUSIVE

6710b

- Intel Core 2 Duo T7500 2.2GHz
- 2GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- Wireless LAN 802.11a/g/n
- Bluetooth 2.0
- Microsoft Office Pro 2007 (60 day trial)
- Windows XP Professional
- Windows Vista Business Upgrade Discs
- 1 Year Warranty

$1599 | V4792 | RENT $15.09/wk*

Satellite Pro S200

TOSHIBA

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- Wireless LAN 802.11a/g/b
- Bluetooth 2.0
- Microsoft Office Pro 2007 (60 day trial)
- Windows XP Professional
- 1 Year Warranty

$1499 | U6917 | RENT $14.14/wk*

8510p

- Intel Core 2 Duo T7250 2GHz
- 1GB DDR2 RAM
- 250GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- ATI Mobility Radeon HD 2600 graphics with 512MB HyperMemory
- Wireless LAN 802.11a/g/n
- Bluetooth 2.0
- Microsoft Office Pro 2007 (60 day trial)
- 1 Year On-site Warranty

$1599 | V5694 | RENT $15.09/wk*

Satellite Pro S200

TOSHIBA

- Intel Core 2 Duo T8300 2.4GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- Wireless LAN 802.11a/g/n
- Bluetooth 2.0
- Microsoft Office Pro 2007 (60 day trial)
- Windows XP Professional
- 3 Year Warranty

$1599 | 72128 | RENT $15.09/wk*

6910p

- Intel Core 2 Duo T8100 2.1GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- CD-RW/DVD-ROM combo – removable plug-in module
- Wireless LAN 802.11a/b/g/n
- Bluetooth v2.0
- Up to 4.5 hours battery life
- Microsoft Windows Vista Business XP Downgrade
- 3 Year Warranty

$1899 | V6717 | RENT $17.52/wk*

Extended Warranty

Protect your investment with a HT Extended Warranty Plan

- Cover for wear and tear, including parts and labour.
- 'No Lemon' Guarantee*
- 7 day customer service helpline

To find out more information on Extended Warranty, ask an Harris Technology team member.

*For terms and conditions, including RentSmart, see page 20. *Available capacity of hard drive may be less due to preinstalled software.

Maximise your technology for your future with Intel's® Leading Centrino® 2 Mobile Technology

Faster & Smarter | Longer Battery Life | Improved Multimedia & Graphics

Based on the latest 45nm Intel® Core™ Microarchitecture and designed for maximum battery life,+ Intel® Centrino® 2 processor technology includes new and innovative features that drive new levels of performance and power savings. Multitask up to 50% faster Intel® Advanced Smart Cache allows both processing cores to access a minimum of 3 MB L2 cache, providing enhanced performance, responsiveness and power savings. The L2 cache balances the data needs of each core, giving you the ability to multitask up to 50% faster than before. A new standard in mobile processing performance Intel's state-of-the-art 45nm processor technology, with a minimum of 3 MB L2 Cache and 1066MHz FSB, delivers up to 50% faster performance, letting you multitask computer intensive applications better than ever.

- More energy efficiency to enable long Notebook battery life.
- Great Wireless Connectivity. 802.11n WiFi + optional WiMAX.
- Smaller packages help OEMS deliver thinner, lighter & sleeker notebook PCs.
- More powerful mobile processor. Stunning HD capabilities.
- Enhanced security & manageability features for business.

Satellite Pro S300

TOSHIBA

- Intel P8600 2.4
- 250GB
- 2GB (2GB & free slot)
- DVD-SuperMulti (DL)
- Vista Business Downgrade XP Pro Media
- Intel 802.11a/g/n,
- Bluetooth V2.1+ EDR Touchpad
- 1 Year Warranty

EXCLUSIVE

$1699 | V8508 | RENT $16.03/wk*

SL500

lenovo

- P8600/2GB (2 x 1024)
- 250GB 5400rpm
- DVD RW Supermulti
- Intel 5100 AGN wiFi
- Webcam
- 6 Cell Battery
- Vista Business 32 Bit
- 1 Year Warranty

$1849 | V8537 | RENT $17.45/wk*

6710b

hp invent

- Intel Core 2 Duo T8300 / 2.4ghz
- 2GB RAM
- 250GB* HD
- DVD±RW (±R double layer) / DVD-RAM with LightScribe Technology
- Intel GMA X3100 Graphics
- Microsoft Windows XP Professional
- Stereo speakers, wireless LAN aerial, Bluetooth aerial

$1699 | V5315 | RENT $16.03/wk*

Satellite Pro S200

TOSHIBA

- Satellite Pro S200
- Intel Core 2 Duo T8300 (2.40GHz) 800
- Genuine Microsoft Windows XP Professional
- 1GB + 1GB DDR2 (667MHz)
- 250GB SATA (5400rpTm)
- DVD-SuperMulti (DL) 12.7mm
- 1Gbps LAN
- WLAN (Intel 802.11a/g/n)

$1699 | V7807 | RENT $16.03/wk*

*For terms and conditions, including RentSmart, see page 20. *Available capacity of hard drive may be less due to preinstalled software.

Lifecam VX-5000

Microsoft

- Flexible base allows users to bend, fold and shape for the best viewing angle on laptop screens, LCD & TFT monitors
- 1.3 Megapixel sensor provides crisp, clear video quality
- World Class VGA Optics allows users to see more clearly with 2x the light collection than regular VGA optics
- Superior low-light performance automatically adjusts for various lighting conditions
- Built-in microphone automatically picks voices with remarkable clarity
- Other features include Windows Live™ Call Button and LifeCam Dashboard

$89.95 | V8060

Quickcam E3500

Logitech

- 1.3 Megapixel sensor provides enhanced image clarity, even in dim lighting
- RightSound technology ensures crystal clear conversations without background noise
- Universal base installs securely on LCD monitors and ultra-thin notebooks
- Optimised for Windows Vista and Windows XP SP2

$59.95 | V8174

Wireless Laser Desktop 7000

Microsoft

- Elegant translucent design and ultra-thin keys inspired by Windows® Aero™
- Ergonomic design encourages natural wrist and arm alignment and allows users to work in total comfort
- 2.4 GHz Wireless Mini Transceiver allows connectivity for up to 3 metres
- Windows Flip 3D allows users to display a 3D overlay of all open windows
- Customised 'My Favourite' keys to allow access to frequently used folders, files and websites
- Scroll four ways for greater efficiency and comfort with Tilt Wheel Technology

$169.95 | V7096

Cordless Laser Desktop LX-310

Logitech

- Contemporary and attractive design featuring glossy back highlights enhances workspaces.
- Cordless secure technology ensures a reliable connection without lags or dropouts
- Customisable function keys allow users to easily access to programs, files and folders
- Hot Keys provide instant access to e-mail, the internet and calculator applications directly from the keyboard

$69.95 | U8238

Wireless Notebook Optical Mouse 3000 – Slate

Microsoft

- A smooth, comfortable and compact notebook mouse designed for convenience and mobility
- Ambidextrous design allows comfortable use in either hand
- Snap-in receiver provides portability and preserves battery life
- High Definition Optical Technology provides users smoother tracking and precision
- 3 button mouse allows access to frequently used media files, programs and documents

$39.95 | T7106 | BLUE
| V7106 | SLATE

MX Revolution

Logitech

- Experience exceptional comfort with an ergonomic grip and deep-sculpted thumb support
- 2.4 GHz wireless technology provides accurate and flawless tracking on virtually any surface
- Hyper-fast scrolling allow users to fly through documents with the MicroGear Precision scroll wheel
- Move effortlessly between applications and documents with a flip the thumb wheel
- Other features include Click-to-Click scrolling and Touch-to-Search

$99.95 | T9986

ICDUX70 Digital Voice Recorder

SONY

- Slim, stylish and powerful digital notetaker provides storage for recorded files and MP3 music files.
- High quality stereo MP3 recording provides clearer stereo sound
- Direct high-speed USB connectivity allows users to drag and drop files directly onto their desktop
- Inputs and outputs: Headphone/Microphone/USB
- Dimensions (WHD): 34.4 mm (W) x 99 mm (H) x 13.4 mm (D)
- Weight: 48g

$249 | V2328 - SILVER
| V2331 - PINK

ClearChat Pro

Logitech

- Laser-tuned speaker drivers provide excellent sound quality
- Plush, padded headband and earcups assure luxurious comfort
- SoundSwitch Equalizer settings for voice, music or PC gaming
- Noise-cancelling microphone
- Rotating, flexible microphone boom with mute indicator
- Convenient headset-based volume and mute

$59.95 | V1816

Desktops

Extensa E261

- Intel Celeron 440 2.06GHz
- 512MB 667MHz DDR2 SDRAM (1 x 512MB)
- 80GB# SATA hard drive
- 16x Dual Layer DVD±RW drive
- SiS Mirage 3 Graphic Controller
- 8 in 1 media card reader
- Windows Vista Home Basic
- 1 Year On-site Warranty†

WITHOUT MONITOR
$469 | V7092
WITH 19" MONITOR
$729
V7102 | RENT $6.87/wk*

Veriton T661

- Intel Core2 Quad Q6600 LGA775 2.4GHz, 8MB cache, vPro technology
- 2GB DDRII 667MHz Dual Channel (2 x 1GB)
- 320GB# S-ATA Hard Drive (7200 RPM)
- 16x Dual Layer DVD+/-RW SATA Burner
- Microsoft Windows XP Professional Operating System
- 3 Years On-Site Warranty†

WITHOUT MONITOR
$1299
V8455 | RENT $12.24/wk*

WITH ACER 22" LCD MONITOR
$1599
V8555 | RENT $15.09/wk*

DX7400 SFF

- Intel Core2 Duo E4600
- 160GBSATA NCQ HDDSMART IV 1st Hard Drive
- 1GB PC2-5300 (DDR2-667)Memory
- NV GF 8400GS (256MB DH) PCIex1 1st Card
- SATA 16XSuperMulti LightScribe 1st Drive
- Windows Vista Downgrade to XP Pro
- 2007 Microsoft Office Ready PC
- 1 Year On-Site Warranty

$899
V8042 | RENT $8.47/wk*

BUNDLE
$1149
V8560 | RENT $10.83/wk*

dc7800

- Intel Core 2 Duo E6550 2.33GHz
- 2GB DDR II SDRAM 667MHz (2 x 1GB)
- 80GB SATA Hard Drive
- 16x DVD±RW Dual Layer optional drive
- Intel Graphics Media Accelerator 3100 + TV Out
- Windows XP Professional
- Office Ready
- 3 Years Limited Warranty

$1149 | V5076 | RENT $10.83/wk*

ThinkCentre A61e

- AMD Athlon X2 BE-2350 2.1GHz
- 1GB DDR II SDRAM 667MHz
- 160GB SATA Hard Drive
- 16x DVD±RW Dual Layer
- ATI Radeon X1200
- Windows Vista Business
- 1 Year Limited Warranty

SUPER SMALL DESIGN

$849 | U5408 | RENT $8.00/wk*

*For terms and conditions, including RentSmart, see page 20. #Available capacity of hard drive may be less due to preinstalled software.
†Onsite warranty is up to 80km from an Acer Authorised Onsite Service Provider.

2232BW

- Interface: Analogue/Digital
- Resolution: 1680 x 1050
- Response time: 2ms
- Contrast ratio: 3000:1
- Brightness: 300 nits
- 3 year on-site exchange warranty and zero dead pixel policy
- Wall mountable
- Tilt function

SAMSUNG

NEW

$349 | V4178

X213WB

acer

- Dot Pitch 0.277mm
- Resolution 1680 x 1050
- Brightness 300 cd/m2
- Contrast Ratio 2500:1 (ACM)
- Viewing Angle 176° (H), 176° (V)
- Response Time 5ms (ACM)
- Input Signal VGA (Analogue D-sub), DVI (w/HDCP)
- Power Consumption <45W
- Kensington Lock Supported
- Weight and Dimensions 5.02 kg 518 x 400 x 177mm
- 3 Years Warranty Pick Up and Return

$349 | V8211

FA-22LCM-WB

FUJITSU

- Interface: Digital
- Resolution: 1680 x 1050
- Response Time: 5ms
- Contrast Ratio: 1000:1
- Brightness: 300 nits
- Built-in Speakers
- 3 Years Limited Warranty

$369 | V4152

L2045W

hp invent

- Interface: Analogue/Digital
- Resolution: 1680 x 1050
- Response Time: 5ms
- Contrast Ratio: 600:1
- Brightness: 300 nits
- 3 Years Limited Warranty

$475 | U5260

2243BW

SAMSUNG

- Dot Pitch/Pixel Pitch: 0.282 mm
- Max Resolution: 1680 x 1050/60Hz
- Colour support: 24-bit (16.7 million colours)
- Image Aspect Ratio: 16:10
- Response Time: 5ms
- Image Brightness: 300 cd/m2
- Image Contrast Ratio: 1000:1 / 8000:1 (dynamic)
- Digital Video Standard : Digital Visual Interface (DVI)
- Signal Input : DVI-D, VGA
- Power Consumption Operational: 45 Watt

$329 | V5326

Projectors

X1160

acer

- DLP Technology
- SVGA 800 x 600 Resolution
- 2000 ANSI Lumens
- 2000:1 Contrast Ratio
- Weighs 2.3kg
- 2 years limited warranty
- Includes remote control

$799

V2864 | RENT $7.53/wk*

VT-49G

NEC 3LCD

- LCD Technology
- SVGA Resolution
- 1600 ANSI Lumens
- 600:1 Contrast Ratio
- Multiple input terminals
- Lamp life 3000 hours
- Compact 2.8kg
- Integrated speaker
- 2 Years limited warranty

$874

U1308 | RENT $8.24/wk*

VPLES5

SONY

- 3 LCD panels, 1 lens projection system
- SVGA Resolution 800 x 600
- 2100 ANSI Lumens
- Lamp: 190 W Ultra high pressure lamp (3000 hours life)
- Projection lens: 1.2 times zoom lens (manual), f18.53 to 22.18mm, F1.65 to 1.93
- Includes soft carry case
- 2 Years limited warranty

$999

V7946 | RENT $9.41/wk*

ViewSonic

PJ551D

- DLP Technology
- XGA 1024 x 768 Resolution
- 2300 ANSI Lumens
- 2000:1 Contrast Ratio
- Weighs 2.8kg
- 3 years warranty
- Eco-Mode Technology
- Includes remote control

$899 | V5940
RENT $8.47/wk*

ViewSonic

Ultra Portable

PJ358

- LCD Technology
- XGA 1024 x 768 Resolution
- 2000 ANSI Lumens
- 500:1 Contrast Ratio
- Weighs 1.8 kg
- 3 years warranty
- Includes remote control
- Integrated speaker

$1199 | V2922
RENT $11.30/wk*

NEC

Portable LCD Projector

VT-491G

- LCD Technology
- SVGA Resolution
- 2000 ANSI Lumens
- 600:1 Contrast Ratio
- Weighs 2.9 kg
- 2 years limited warranty
- Includes soft carry case and remote control
- Integrated speaker

$1129 | U8614
RENT $10.64/wk*

TOSHIBA

Ultra Light

TDP-P9

- DLP Technology
- XGA 1024 x 768 Resolution
- 2000 ANSI Lumens
- 2000:1 contrast ratio
- Weighs 1.3kg
- 3 years part and labour warranty
- Includes soft carry case and remote control

$1699 | V3644
RENT $16.03/wk*

*For terms and conditions, including RentSmart, see page 20.

ProLiant ML115 Small Business Server Standard Bundle

The HP ProLiant 100 Series servers have tailored features to meet the specific usage needs of small businesses and remote or unmanaged sites. This powerful yet simple platform provides all the relevant server features in an easy-to-use and easy to afford package. Features, such as AMD Opteron and Athlon processors, DDR II ECC memory, PCI and PCI-Express slots, dual serial ports, four hard disk drive bays, and eight USB 2.0 ports deliver the off-the-shelf functionality with expandability for small businesses.

- AMD Dual Core Opteron Processor 1210, 1.8GHz, 2MB cache
- 1GB (2 x 512MB) DDR2 memory
- 2 x 160GB* SATA hard drive
- Integrated 4 ports serial ATA controller with embedded RAID
- Embedded NC320i PCIe Gigabit NIC
- Warranty: 1 year parts, 1 year labour, 1 year on-site†
- Microsoft Windows Small Business Server 2003 - Standard Edition R2

$1399

U7946 | RENT $13.20/wk*

Smart-UPS 750VA USB & Serial (Black)

- Input 230V/Output 230V, Interface Port DB-9 RS-232, USB, SmartSlot
- Typical Backup Time at Full Load - 4.8 minutes (500 Watts)
- Battery replacement without tools
- Disconnected battery notification
- Front-access servicing
- USB connectivity
- Includes: CD with software, Smart UPS signalling RS-232 cable, USB cable, User Manual

$675

Q9585 | RENT $6.36/wk*

Smart-UPS 750VA XL USB (Black)

APC Smart-UPS XL protects your data by supplying reliable, network-grade power with scalable run-time in tower and rack mount form factors. With optional, matching battery packs, run-time can be easily extended and optimized for the application. APC understands long run-time requirements so; Smart-UPS XLs can be configured with up to 10 additional battery packs - for run-times exceeding 24 hours, if necessary.

$919

F5131 | RENT $8.66/wk*

Belkin Economy 6 Way Surge Protector - 2 Metres

There is no need to worry about your general household electronics when they are connected to a Belkin Surge Protector. Disturbances in the steady flow of power are common and damaging, but don't worry. With a Belkin Surge Protector, you are protected for life.

$24 | L0555

Back-UPS ES 550VA 230V

The Back-UPS ES offers affordable battery backup and surge protection for home computers. With enough power outlets to protect your entire system, built-in phone/fax/modem line (DSL compatible) protection and easy-to-install safe system shutdown software all make this power protection solution the best value for home and home office computers.

Specifications

$202 | V2734

*For terms and conditions, including RentSmart, see page 20. †Onsite warranty is up to 80km from an HP Authorised Onsite Service Provider.

WG102AU ProSafe Wireless G Access Point

NETGEAR

- High-speed IEEE 802.11g, up to 108 Mbps in turbo mode
- Wi-Fi Protected Access™ (WPA) – 802.11i-ready security
- Integrated IEEE 802.3af Power over Ethernet (PoE).

$225 | Q0634

DGS-1016D 16 Port 10/100/1000Mbps Gigabit Switch

D-Link Building Networks for People

- 32Gbps switching capacity
- 8K MAC Address
- Table Rack mountable or Desktop

greenethernet

$353 | Q9448

FVS336G ProSafe™ Dual WAN G-bit Firewall SSL & VPN

NETGEAR

- Supports up to 25 IPsec VPN tunnels and 10 SSL VPN tunnels simultaneously
- Supports two broadband connections, in either a load-balancing or fail-over configuration
- Backed by a lifetime warranty

$499 | V3033

SFE2000P 24 Port Stackable/Managed Ethernet Switch with PoE

LINKSYS

- Fully resilient stacking provides optimised growth with simplified management
- Provides IEEE 802.3af Power over Ethernet (PoE) power to IP phones, cameras, or APs
- Maximum security and control of traffic with policing, shaping, ACLs, and QoS (Quality of Service)

$999 | U7892 | RENT $9.41/wk*

DFL-210 NetDefend™ Security Firewall for SOHO

D-Link Building Networks for People

- Features : Firewall protection, DMZ port, DHCP support, NAT support, VPN support, PAT support, load balancing, VLAN support, IGMP snooping, Syslog support, Stateful Packet Inspection (SPI), content filtering, ALG support, Intrusion Detection System (IDS), firmware upgradable
- 3 Years Warranty

$629 | T8412 | RENT $5.93/wk*

24 Port Managed, Stackable Gigabit PoE Switch + 4 Shared SFP Ports

LINKSYS

- Fully resilient stacking provides optimised growth with simplified management
- Provides IEEE 802.3af Power over Ethernet (PoE) power to IP phones, surveillance cameras, or APs
- Maximum security and control of traffic with policing, shaping, ACLs, and QoS (Quality of Service)
- Linksys One Ready - simple, automated installation with Linksys One Services Routers

$1499 | U7895 | RENT $14.14/wk*

GSM7224R ProSafe 24 Port Gigabit L2 Managed Switch

NETGEAR

Wirespeed Gigabit performance. Full set of Layer 2+ management features, including Static Routing. Flexible fibre connectivity enabled through four combination Small Form-factor Pluggable (SFP) gigabit interfaces.

$1299 | V6081 | RENT $12.24/wk*

DSA-3600 Multi-Service Business Gateway

D-Link Building Networks for People

The DSA-3600 is a high-performance, all-in-one multi-service network appliance designed specially for small and medium business operational environment.

- Single point of user access control and AP management
- No client device configuration
- Customisable login portal page
- Ease of maintenance

$1559 | V3042 | RENT $14.71/wk*

DFL-860 NetDefend UTM Firewall for SMB

Powerful Unified Threat Management (UTM) Firewall for Small Businesses

- Integrated Firewall/VPN appliance
- Intrusion Prevention System (IPS)
- Anti-Virus (AV) protection
- Web Content Filtering (WCF)
- Proactive end-point security with D-Link ZoneDefense
- Powerful hardware accelerator and VPN performance

$1499 | V5017 | RENT $14.14/wk*

*For terms and conditions, including RentSmart, see page 20.

DSL-G604T Wireless G ADSL2/2+ Modem/Router with 4 Port

- ADSL2/2+ modem/router with 54Mbps wireless and built in 4 port switch
- Built-in SPI Firewall, DHCP Server
- 4 port Fast Ethernet and 802.11g wireless connectivity

D-Link Building Networks for People

$119 | P3062

WRT54G Wireless G Broadband Router + 4 Ports

- All-in-one Internet-sharing Router, 4 port Switch and Wireless G (draft 802.11g) Access Point
- Wireless data rates up to 54Mbps - 5 times faster than Wireless B (802.11b)
- Advanced wireless security with 128-bit WEP encryption, MAC or IP address filtering
- 3 Year Limited Warranty

LINKSYS® A Division of Cisco Systems, Inc.

$89 | H9739

WPC54G Wireless G Notebook Adapter | $49 | H9738

WPN824 RangeMax Wireless G Router + 4 Ports

NETGEAR

- Up to 1000% more wireless coverage and speed than 802.11g
- 7 Internal Smart Antennas adapt on the fly to interference
- 100% compatible with 802.11b, 802.11g, and SuperGÆ devices
- Ultra-Secure (double firewall, WEP, WPA-PSK) protect against unauthorized usage

$119 | R5401

DKT-USBN Wireless N Router + USB Adapter KIT

D-Link Building Networks for People

- Share internet access with PCs, game consoles, and media players
- Parental controls to supervise internet activity
- Firewall protection for your network
- Backward compatible with 802.11g and 802.11b Networks
- Connect to secure wireless networks using WEP, WPA, and WPA2

$189 | V7246

WAG160N Wireless N ADSL2/2+ Gateway

LINKSYS® A Division of Cisco Systems, Inc.

- High-speed ADSL2+ Modem gives you a fast, "Always On" connection to the Internet
- Connect your PCs via the built-in Router and 4-port Switch to jump start your Ethernet network and share the Internet
- Built-in Wireless N (draft 802.11n) Access Point also lets you connect without running wires – far faster than standard Wireless G
- MIMO technology uses multiple radios to create a robust signal that travels much farther with reduced dead spots

$199 | V7268

WNHDEB111 RangeMax Wireless N HD/Gaming Kit

NETGEAR

- For high-performance wireless network gaming and multiple HD video streaming
- More wireless channels, less interference and better connections using 5 GHz Wireless N band
- Automatic Quality of Service (QoS) ensures lag-free gaming and jitter-free HD streaming
- Works with Xbox™, PlayStation®, Wii™, TiVo® HD, Slingbox™, digital set-top boxes, NETGEAR's Digital Entertainer HD, Apple® TV, network attached storage (NAS), and more

$349 | V5884

DMA2200 Media Center Extender with DVD

LINKSYS® A Division of Cisco Systems, Inc.

- Access video, music, and photos from your Microsoft Windows Vista Media Center PC and stream it to your home entertainment system
- Stream live TV content, movies, photos and music from your Media Center PC on your living room HDTV. Includes learning remote control
- Built-in, Upscaling DVD-Video player (720p, 1080i and 1080p).

Delivery only Charges Apply

$499 | V5035

Netgear EVA8000 HD Digital Entertainer

NETGEAR

- Streams movies, videos, music, Internet radio, and photos from your home PCs and storage devices to your HDTV
- Automatically finds all the digital media files on your home network and organizes them into an easily accessible library
- Play YouTube™ Videos on your TV

Delivery only Charges Apply

$599 | U7492

Hard Drives, Burners & USBs

TurboUSB 500GB Pocket Hard Drive

BUFFALO

- High-Speed USB 5,400rpm
- Easy Setup - no need to install drivers
- Supports USB 2.0

$279 | V8553

Also available:
320GB | V8552 | **$179**

Passport Essentials 250GB Pocket Hard Drive

Western Digital

- High-speed USB
- Fits in your pocket
- PC and Mac compatible
- 3 Years Limited Warranty

$149 | V6729 | BLACK
V6874 | BLUE
V6873 | RED

Also available:
320GB | **$179**

OneTouch™ 4 Mini 160GB Portable Hard Drive

Maxtor

- Offers the same protection as the desktop model
- Travel friendly, compact design and shock resistant

$129 | V5478

Passport Elite Titanium 320GB

Western Digital

A luxurious soft-touch finish makes these drives easy to grip, comfortable to hold, and beautiful to show off. Combine that with mega-capacity that fits in your pocket, plus a whole host of powerful features.

$254 | V7358

Also available:
250GB | V7357 | **$229**

Rugged Mobile 250GB Hard Drive

LACIE

- FireWire 800, FireWire 400 and USB2.0 interface
- Durable, all terrain casing
- Scratch protected aluminium and shock resistant rubber bumper
- Plug and play on Mac and PC
- Includes 1-click backup software

$269 | V2301

Also available:
320GB | V5784 | **$329**

Blue-Ray Writer

PIONEER

This writer is the all in one solution for anyone wanting to create high quality content for Blue-ray Disc, DVD or CD. Offering revolutionary 4x burning speed, it can create a full BD-R 25GB disc in around 25 minutes.

$499 | U8692
Delivery only

Also available:
BR-COMB | U8691 | **$229**
EXT DVD RW | V7635 | **$129**
INT DVD RW | V7636 | **$64.95**

LittleDisk 60GB Drive USB2.0

LACIE

- Integrated USB cable, no extra connection cables are required
- Removable protective cap
- USB powered
- Sync & Encryption software
- Driver free

$189 | V4760

Also available:
20GB | V5929 | **$79**

Slim Portable 8x DVD±RW with LightScribe

LACIE

- USB bus-powered
- Double layer DVD technology
- LighScribe labelling software (Windows)
- Easy Media Creator Suite 9 burning software (Windows)

$99 | V2283

Also available:
D2 NEXT DESKTOP | V2267 | **$129**
D2 DESKTOP | V1814 | **$169**

HOT DEALS on USBs

	SONY. Microvault Click		SONY. Turbo Click		BUFFALO Turbo		SanDisk Cruzer U3		SanDisk Cruzer Titanium		SanDisk Cruzer Contour	
4GB	V7499	$33.95	V7662	$44.95	V5427	$32.99	U8760	$32.95	U8762	$39.95	-	
8GB	V7498	$57.95	V7663	$79.95	V5428	$69.95	V2315	$54.95	V6856	$69.95	U8758	$89.95
16GB	V7497	$129	-		-		-		-		V6855	$139

Network Storage & Internal Hard Drives

EasyStore 2TB NAS Drive

acer

- Backup and storage solution for home and business
- Store tonnes of critical business data, movies, music, and photos
- Stream hours of digital content to your entire home and business wirelessly
- One stop for a perfect digital media solution

$999 | V7532 | RENT $9.41/wk*

ReadyNAS™ Duo 500GB Intelligent Network Storage for Digital Media

NETGEAR

- Compatible with SATA and SATA II HDD
- Hot swappable and lockable trays
- Ethernet Gigabit
- 3 USB 2.0 ports
- Embedded BitTorrent™ client for direct downloading from the internet

$579 | V5249 | RENT $5.46/wk*

ReadyNAS™ NV+Gigabit Desktop NAS

NETGEAR

- Perfect NAS for Small Office and Home Office
- Patent Pending X-RAID™ Technology
- Hot swappable
- Small 8" high desktop design

NO DISK | V1246 | **$1389** | RENT $13.11/wk*
1TB 4 DISKS | V8794 | **$1449** | RENT $13.67/wk*
2 TB 2 DISKS | V5008 | **$2399** | RENT $22.19/wk*

ReadyNAS™ 1100 Dual Gigabit Rackmount NAS

- 2 Gigabit Interfaces
- RAID Technology
- 4 Hot Swap SATA disks
- 12" deep 1U

3 TB | U8818 | **$3948** | RENT $35.19/wk*
4 TB | V4971 | **$6399** | RENT $53.44/wk*

Delivery only Charges Apply

NAS200 2-Bay Enclosure

LINKSYS

- Easily add storage space onto your network with two SATA Hard Drive Bays
- Add extra storage with two USB 2.0 ports
- Share files locally or through the Internet from any PC

$199 | V0668

DNS-313 1-Bay SATA NAS Enclosure

D-Link Building Networks for People

- Power management to conserve energy and extend life of hard drive
- Easy to use, manage by your web browser

$189 | V5002

DNS-323 2-Bay NAS Enclosure

D-Link Building Networks for People

- Secure and share your digital files
- Insert up to two internal 3.5" SATA Hard drives without any tools
- Access stored files over the internet.

$349 | U4955

My Book World Edition II 1TB External Hard Drive

Western Digital

- Unique remote-access storage system for wired or wireless networks

$399 | U9550

1TB Big Disk Gigabit Ethernet Mini External Hard Drive

LACIE

- Gigabit Ethernet and USB2.0 interface
- Expandable capacity through a USB host port
- User and share level permissions

$479 | U5309

1TB 2 Big Network 2-Disk RAID

LACIE

- Fast FireWire 2-disk RAID storage for creative professionals
- Ideal for protecting your critical folders
- 2 hot swappable disks with locks

$579 | V5001 | RENT $5.46/wk*

HOT DEALS on SATA & IDE Drives

SATA INTERNAL HARD DRIVES			
U9765	**1TB**	16MB Cache	**$299**
V4735	**750GB**	32MB Cache	**$279**
V3794	**500GB**	32MB Cache	**$149**
IDE INTERNAL HARD DRIVES			
U5323	**500GB**	16MB Cache	**$149**

PICK ONE UP TODAY AND SAVE!

Seagate

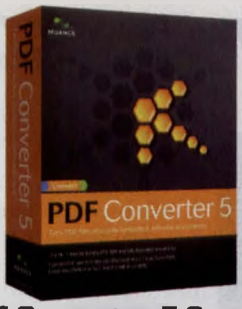
*For terms and conditions, including RentSmart, see page 20.

Software

Acrobat 9 Pro

- Create and reliably share PDF documents.
- Convert e-mail to PDF.
- Insert video in PDF files.

$589 | WIN | V8278
| MAC | V8279



PDF Converter 5.0

Turns existing PDF files into fully-formatted documents, forms and spreadsheets - complete with text, columns, tables and graphics. Save time and money by converting your PDF files.

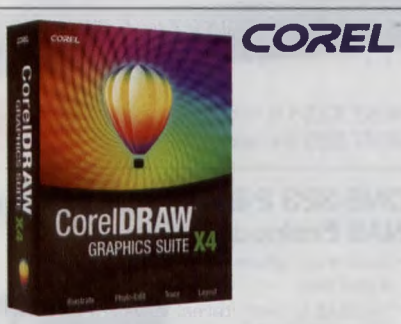
$69 | V6035

Also Available: Professional | $195 | V6037

True Image 11 Home

- Create an exact copy of your PC for a full backup
- Backup and restore your music, video, data and pictures
- Backup your emails and Outlook data and settings
- Protect your PC application configuration settings
- Schedule backups automatically by time or system events

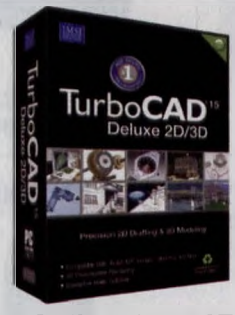
$69 | V2998



CorelDRAW Graphics Suite X4

CorelDRAW® Graphics Suite X4 lets you tackle creative projects with confidence. This all-in-one design and graphics solution includes new tools, market-leading file compatibility and updated high-quality content.

$549 | V5703



TurboCAD Deluxe 15

An all-purpose CAD program for all projects at home and at the office. Create precision 2D drawings, intricate 3D models, and utilise powerful Photorealistic rendering tools to accurately visualise and present your ideas. Includes millions of Symbols and 200+ 2D Training Lessons.

$179 | V7568

Vegas Movie Studio Platinum 8

- Import and edit support for HD Sony AVCHD
- 24 new DVD themes
- ATRAC editing and encoding
- Gracenote® MusicID™ CD album recognition
- Import and edit DV, HDV, and other video formats

$199 | U9445

Your Software Licensing Solution Specialist

Microsoft CERTIFIED Partner

Software Licensing provides businesses with a cost effective way to acquire multiple copies of software.

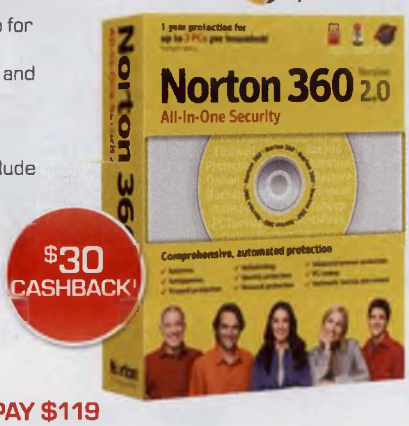
We have the experts!
Our Software Licensing Professionals are trained experts on licensing products in the market, to help you find the right solution for your business.

We save you time and money!
The most suitable Software Licensing solution will be identified for you to ensure the chosen product simplifies your administration and installation process.

We are here to support you!
Support and maintenance are always available to ensure your business has the latest Software Licensing Solutions.

Norton 360 2.0

- Easy security, backup and tuneup for up to 3 PCs
- Stronger protection as you shop and bank online
- New wireless network security features
- Flexible backup options now include HD-DVD, Blu-ray Disc™, iPod®
- 2GB of secure online storage also included



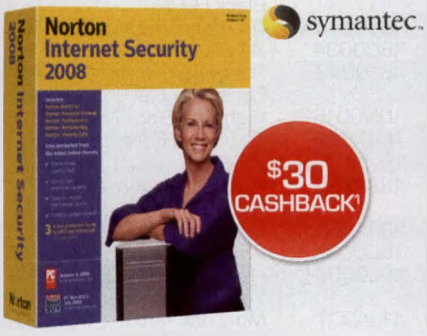
$89 | 3 PCS | V8551
BEFORE CASHBACK YOU PAY $119

Office Small Business 2007

Includes Word 2007, Excel 2007, PowerPoint 2007, Outlook 2007 with BCM, Publisher 2007.

Office Small Business 2007 is the complete, powerful and easy-to-use productivity and contact management suite. It will offer new tools to help employees at small businesses work more efficiently and effectively so they can deliver better customer service.

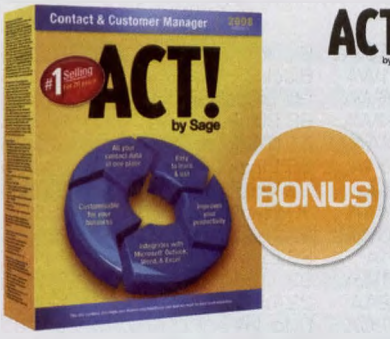
$149 | U1823



Norton Internet Security 2008 3PCS

- Easier install
- Lighter on your PC
- Fast access to free online help
- Essential for online banking and shopping

$59 | V1385
BEFORE CASHBACK YOU PAY $89



ACT! by Sage 2008

Renowned for its ease of use, ACT! helps business professionals work better and smarter.

- New interactive dashboards
- Compatibility with Office 2007 and Vista
- Direct integration with Outlook email

$239 | V1139

BONUS Upgrade to 2009 version¹

Office Small Business 2007

Includes Word 2007, Excel 2007, PowerPoint 2007, Outlook 2007 with BCM, Publisher 2007.

$449 | U1827

PC-cillin Internet Security Pro 2008

- Anti-Virus blocks Internet worms and intruders at point of entry
- Anti-Spyware stops spyware from tracking you online
- Email safety scan removes viruses from email and instant messages

$98 | 3 USER | V1333

Internet Security Suite 2008

It is a proactive 10-in-1 always-updating security bundle that protects what you value with multiuser child safety, identity theft prevention, email and IM protection, and automated back-up. It gives you the confidence to surf the web, shop, bank, email, chat and download files safely and securily.

$89 | 3 USER | V1275

BONUS $50 CASHBACK via redemption¹

Windows Vista Home Premium with SP1

- Enjoy the visually compelling Windows Aero desktop experience with Flip 3D navigation
- Edit High Definition home movies with Windows Movie Maker
- Keep children safer online with customisable Parental Controls

$126 | UPGRADE ACADEMIC² | V6720

¹Cashbacks and bonuses available by redemption from supplier. Postage and conditions apply. ²For non-commercial use only.

94 Black

$35.95 | Q1680

LC-57BK brother at your side

$32.95 | U1087

PGI 5BK Canon

$24.95 | S9562

Canon CLI8VPII

Value Pack BK/C/M/Y & 240 sheets paper

$99

V7325

Harris Technology has a wide range of ink, toner and paper consumables at competitive prices from all leading brands. Shopping for your consumables is easy with ht.

Visit **ink.ht.com.au**

INKS

HT Part	Vendor Part	Colour	Price
HP			
Q1680	C8765WA	Black	$35.95
T1633	C8721WA	Black	$31.95
Q1676	C8766WA	95 Tri Colour	$39.95
T7733	C9364WA	98 Black	$29.95
T0852	C9351AA	21 Black	$25.95
S2199	C6656AA	56 Black	$32.95
T3790	C9396A	88 Black - Large	$57.95
70165	C4844AA	10 Black	$59.95
Q1870	C9363WA	97 Tri-Colour	$59.95
T3786	C9391A	88 Cyan - Large	$41.95
T1658	C9361WA	93 Tricolor	$32.95
T0853	C9352AA	22 Tri Colour	$29.95
T1635	C8771WA	Cyan Ink	$16.95
T3789	C9393A	88 Yellow - Large	$41.95
T1634	C8772WA	02 Magenta	$16.95
Q1677	C8767WA	96 Black - High Volume	$53.95
T3787	C9392A	88 Magenta - Large	$41.95
V1604	CC629AA	56/57 Twin Pack	$76.95
U8951	C4939A	18 Yellow	$24.95
U8950	C4936A	18 Black	$32.95
T1659	C9362WA	92 Black	$25.95
T1637	C8774WA	02 Light Cyan	$13.95
T1636	C8773WA	02 Yellow	$16.95
U8952	C4938A	18 Magenta	$24.95
U1023	SA307AA	94/95 Combo Pack	$60.95
F9886	C6657AA	No 57 Tri-Colour	$45.01
22643	51645AA	45 Black	$52.95
U8954	C4937A	18 Cyan	$24.95
B8508	C4810A	No 11 Black Ink Printhead	$59.95
Q1679	C9369WA	99 Tri-Colour Photo	$43.95
A2595	C6615DA	15 Black	$48.95
S3034	C6578DA	78 Tri-Colour	$56.95
V7796	C9384A	72 Matte Black/Yellow Printhead	$101.00
U9693	C9374A	72 130ml Gray	$104.00
U9694	C9373A	72 130ml Yellow	$104.00
V7797	C9370A	72 130ml Photo Black	$104.00
V7798	C9371A	72 130ml Cyan	$104.00
70166	C4841AA	10 Cyan	$55.95
G0251	C8727AA	27 Black	$32.95
V2813	CB336WA	74XL Black	$51.95
B1729	C4837AA	11 Magenta	$54.95
EPSON EXCEED YOUR VISION			
V5894	C13T087090	Gloss Optimiser TWIN PACK	$18.17
V5895	C13T087190	Photo Black	$24.91
V5896	C13T087290	Cyan	$25.16
V5897	C13T087490	Yellow	$25.16
V5898	C13T087790	Red	$25.16
SAMSUNG			
D8975	INK-M10		$79.00
F5233	INK-M40	Black	$55.00

HT Part	Vendor Part	Colour	Price
LEXMARK			
F1662	18L0032	26.953 mm	$49.00
V2741	TPANZ02	27 Colour & # 17 Black Hi-Res	$52.00
V0909	18Y0144A	44 High Yield Mono	$43.00
P7483	18C0034	34 Black	$42.00
F1664	18L0042	Photo Colour Cartridge 83	$54.00
E0842	10N0016	High Res Black No 16	$39.00
U8388	TPANZ09	Twin Pack Cartridge 32 & 33	$42.00
B0581	12A1985	High Resolution/High Yield	$72.00
88239	12A1985	Colour 45	$72.00
P7484	18C0035	35 colour Print	$50.00
L1345	18L0000	High Resolution High Yield Colour	$69.00
Q2619	11J4001	Mono Ink Tanks, Tri-pack, 3k pages	$235.00
V4933	18Y0143A	43 Colour	$42.99
brother at your side			
U1087	LC-57BK	Black	$32.95
U1088	LC-57C	Cyan	$18.95
U1089	LC-57M	Magenta	$18.95
U1090	LC-57Y	Yellow	$18.95
V6955	LC57CL3PK	Colour Value Pack (C,M,Y)	$56.95
V6953	LC57BK2PK	Twin Pack	$67.95
T7161	LC-47CL3PK	Colour Value Pack	$46.95
Q1657	LC-47BK	Black	$32.95
T7160	LC-47BK2PK	Black Twin Pack	$55.95
V1780	LC57CL 3PK	Colour Value Pack	$58.65
V1821	LC-37BK	Black Ink	$26.95
Canon advanced simplicity			
S9562	PGI5BK	Black	$24.95
S9565	CLI8Y	Yellow	$26.95
H8779	BCI15BK	Black Ink	$25.95
81586	BCI3EBK	Black	$22.95
V7325	CLI8VPII	Value pack 1x CLI8BK/C/M/Y & 250 Sheets Paper	$99.00
R9653	BCI16C	Colour	$44.95
S9564	CLI8M	Magenta	$26.95
S9563	CLI8C	Cyan	$26.95
C3428	BCI6Y	Replacement Yellow Ink Tank	$24.95
C3420	BCI6BK	Replacement Black Ink Tank	$24.95
81587	BCI3EC	Cyan	$19.95
C3424	BCI6C	Replacement Cyan	$24.95
C3426	BCI6M	Replacement Magenta Ink Tank	$24.95
S9587	CLI8BK	Photo Black	$26.95
S7128	PG40	Black	$37.95
S9213	CL41	Tri-Colour	$39.95
T4114	CLI8PC	Photo Cyan Ink Tank	$26.95
81588	BCI3EM	Magenta	$19.95
81589	BCI3EY	Yellow Cartridge	$19.95

Inks & Toners

TONERS

HT Part	Vendor Part	Colour	Yield	Price
hp				
N8595	Q3960A	Black	5,000	$139.00
L0381	Q2612A	Black	2,000	$119.00
U4729	Q7553A	Black	3,000	$123.00
N8600	Q3964A	Drum	20,000 Blk/ 5,000 Clr	$289.00
S5168	Q6000A	Black	2,500	$99.00
N9528	Q3962A	Yellow	4,000	$169.00
N9532	Q3963A	Magenta	4,000	$169.00
N9527	Q3961A	Cyan	4,000	$169.00
U4730	Q7553X	Black	7,000	$226.00
S5170	Q6001A	Cyan	2,000	$139.00
S5171	Q6002A	Yellow	2,000	$139.00
S5172	Q6003A	Magenta	2,000	$139.00
P9322	Q5949A	Black	2,500	$119.00
U5333	Q7551X	Black	13,000	$333.00
J0537	Q2610A	Black	6,000	$199.00
V7683	CB540A	Black	2,200	$114.00
G7580	Q1338A		12,000	$234.00
T3958	Q6470A	Black	6,000	$219.00
N8598	Q3972A	Yellow	2,000	$119.00
P9323	Q5949X	Black	6,000	$219.00
U4777	Q7551A	Black	6,500	$209.00
N8597	Q3971A	Cyan	2,000	$119.00
N8599	Q3973A	Magenta	2,000	$119.00
Q4124	Q5942X	Black	20,000	$349.00
F1352	C9720A	Black	9,000	$239.00
Q4123	Q5942A	Black	10,000	$229.00
V4240	CB435A	Black	1,500	$92.84
M0866	Q2670A	Black	6,000	$199.00
Q4121	Q6511X	Black	12,000	$349.00
D0031	C7115X	Black	3,500	$129.00
C0249	C8061X	Black	10,000	$199.00
J0535	Q2613X	Black	4,000	$139.00
54731	C4127X	Black	10,000	$199.00
73192	C4096A	Black	5,000	$169.00
U0150	Q7516A		12,000	$299.00
V0121	CB436A	Black	2,000	$121.00
T3959	Q6471A	Cyan	4,000	$211.00
T4648	Q7582A	Yellow	6,000	$266.00
T4649	Q7583A	Magenta	6,000	$266.00
Canon				
S7054	FX9	Black	2,000	$149.00
Q6538	CARTU	Black	2,500	$119.00
T6876	CART308	Black	2,500	$100.00
S6944	CART301D	Drum	-	$270.00
87989	EP-22CART	Black	2,500	$109.00
L7104	EP26CART	Black	2,500	$129.00
T6877	CART308II	Black	2,500	$189.00
T6890	CART307C	Cyan	2,200	$104.00
J2822	EP87Y	Yellow	4,000	$135.00
EPSON				
G9705	C13S050100	Black	4,500	$114.00
R4241	C13S050189	Cyan	4,000	$199.00
R4237	C13S050190	Black	4,000	$119.00
G9708	C13S050097	Yellow	4,500	$249.00
G9707	C13S050099	Cyan	4,500	$247.00
G9706	C13S050098	Magenta	4,500	$247.00
FUJI XEROX				
T3238	CWAA0649	Black	2,500	$74.95
R6900	CT200649	Black	4,000	$129.00
U9183	108R00723	Cyan	3,400	$132.00
U9186	108R00724	Magenta	3,400	$132.00
R6904	CT350390	Drum	42,000 Blk/ 10500 Clr	$288.00
V5753	CT201114	Black	2,000	$100.00

HT Part	Vendor Part	Colour	Yield	Price
brother at your side				
R7305	TN-2025	Black	2,500	$90.00
T3576	TN-3185	Black	7,000	$129.00
D8989	TN-8000	Black	2,200	$50.00
95205	TN-6600	Black	3,000	$119.00
V1733	TN-155BK	Black	2,500	$143.00
M9543	TN-04BK	Black	10,000	$249.00
C6970	TN-7600	Black	6,000	$127.00
U9255	TN-155BK	Black	5,000	$130.00
S2372	DR-2025	Drum	12,000	$149.00
D8849	PC-201	Black	450	$37.00
R8799	PC-501	Black	450	$25.00
LEXMARK				
T7314	12017SR	Black	2,000	$109.00
L5690	18S0090	Black	3,200	$109.00
T9775	X340H11G	Black	2,500	$192.00
U2318	C5220KS	Black	4,000	$153.00
V4992	C5242KH	Black	8,000	$282.00
U2374	C5220MS	Magenta	3,000	$175.00
U2408	C5220YS	Yellow	3,000	$175.00
U2427	C5220CS	Cyan	3,000	$175.00
V4989	C5242CH	Cyan	5,000	$285.00
V4990	C5242MH	Magenta	5,000	$285.00
V4991	C5242YH	Yellow	5,000	$285.00
N5855	20K1403	Black	10,000	$260.00
N5856	20K0504	Photo Developer	40,000 Images	$330.00
KONICA MINOLTA				
R0703	1710590-004	Black	4,500	$154.00
F8855	1710517-008	Cyan	4,500	$219.00
R0707	1710590-007	Cyan	4,500	$219.00
F8854	1710517-007	Magenta	4,500	$219.00
F8853	1710517-006	Yellow	4,500	$219.00
F8852	1710517-005	Black	4,500	$145.00
R9462	1710591-001	Drum	45,000	$222.00
R0704	1710590-005	Yellow	4,500	$219.00
R0706	1710590-006	Magenta	4,500	$219.00
F8856	1710520-001	Drum	45,000	$219.00
V0511	4065-621	-	18,000	$52.96
V2775	4519-401	Drum	20,000	$143.00
Q6453	1710583-004	Cyan	6,000	$275.00
SAMSUNG				
T6647	SCX-4521D3/SEE	Black	3,000	$124.00
T6648	SCX-D4200A/SEE	Black	3,000	$125.00
P8099	SCX-4100D3	Black	3,000	$125.00
J9653	SCX-4216D3	Black	3,000	$119.00
U0652	CLP-K300A/SEE	Black	2,000	$99.00
U5518	CLP-W300A/SEE	Black	2,000	$22.38
U0653	CLP-C300A/SEE	Cyan	1,000	$89.00
U0654	CLP-M300A/SEE	Magenta	1,000	$93.05
U0655	CLP-Y300A/SEE	Yellow	1,000	$89.00
S2534	CLP-510D7K/SEE	Black	7,000	$179.00
J2380	ML-1710D3	Black	3,000	$119.96
T0776	ML-2010D3/SEE	Black	3,000	$129.00

hp
Q3960A Colour LaserJet 2550 Black Toner

$139
N8595

brother at your side
TN-2025 Toner

$90
R7305

SAMSUNG
SCX 4521F 3000 Toner

$124
T6647

GREAT RANGE OF BIG BRANDS ON INK & TONER

New One 3.5" GPS

TOMTOM

- The NEW TomTom One provides drives with a portable navigation device that is easy to use and has the latest maps and technologies
- New ultra compact pocketable design with 3.5" touch screen maximises portability
- Crystal-clear 3D graphics with pre-loaded Whereis V.15 2005 mapping on 1GB internal memory
- Loud and clear voice instructions guide users on their journey, including text-to-speech street names
- Provides users with speed camera warnings

$349 | V8490

New XL 4.3" GPS

TOMTOM

- The NEW TomTom XL provides drives with a portable widescreen navigation device that is easy to use
- New ultra compact pocketable design with 4.3" touch screen maximises portability
- Crystal-clear 3D graphics with pre-loaded Whereis V.15 2005 mapping on 1GB internal memory
- SD card slot provides additional memory
- Loud and clear voice instructions guide users on their journey, including text-to-speech street names
- Provides users with speed camera warnings

$449 | V8488

S50 4.3" Widescreen + BT GPS

NAVMAN

- Clear visual giudance on the 4.3" anti-glare touch screen
- Bluetooth hands-free capabilities
- Preloaded Speed and red light camera alerts
- The latest comprehensive maps for Australia
- 2 year warranty on all items in the box
- Shortcuts to Petrol, Parking & Emergency Services (SOS)
- PIN security code anti-theft deterent
- Intelligent day/night display

$399 | V2787

Navman latest map guarantee – Upgrade to 2008*

S90i 4.3" Widescreen GPS

NAVMAN

- 4.3" anti-glare touch screen
- Bluetooth hands-free capabilities
- Text-to-Speech that reads out street names
- 2 megapixel NavPix camera
- Preloaded speed and red light camera alerts
- Traffic antenna for future live traffic services
- The latest comprehensive maps for Australia
- 2 year warranty on all items in the box

$549 | V1313

Navman latest map guarantee – Upgrade to 2008*

Treo 500 Smartphone

- Broadband-like 3G speeds
- Microsoft Office Word, Excel & PowerPoint Mobile, plus PDF viewer
- Windows Media Player 10 Mobile
- Bluetooth 2.0 + EDR wireless technology
- Microsoft Internet Explorer Mobile web browser
- Windows Live including MSN Messenger
- 2.0 megapixel camera captures video too
- 150MB of memory, expandable with microSD expansion card

$499 | V5670

HOT PRICE

Ultimate 8150 3G Smartphone

i-mate

- Phone, PC & MP3 Player all-in-one
- Powered by 3G (HSDPA) and Wi-Fi (802.11b/g/e/i)
- Windows Mobile 6 Professional allows users to access Microsoft Office, email and the internet
- 2.6" VGA 65k colour LCD screen
- 2.0 Megapixel digital camera/video with auto focus
- Built in MP3 Player & FM Radio
- Bluetooth V2.0 enabled which allows users to share files with ease

$899 | V8172 | RENT $8.14/wk*

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NEW

Canon

Revolutionary 'clear-ink' technology delivers professional quality printing on plain paper. This flagship Office All-In-One offers your business fax, duplex print, copy scan functionality.

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- 2 Sided Printing
- Individual Inks
- 23 PPM Colour
- 28 PPM Black
- 4800 x 1200 Print DPI
- 300 Sheet Capacity
- 35 Sheet ADF
- 1 Year Warranty

$549 | V7988

OfficeJet Pro L7590 Multifunction

- Network Ready
- Individual Inks
- 2 Sided Printing
- 34 PPM Colour
- 35 PPM Black
- 4800 x 1200 Print DPI
- 250 Sheet Capacity
- 50 Sheet ADF
- Up to 125 Page Out Of Paper Memory
- 1 Year Warranty

NEW

$449 | V7713

OfficeJet J6480 Wireless Multifunction

- Fax Modem 33.6Kbps
- Wired/Wireless Network Ready
- 2 Sided Printing
- 25 PPM Colour
- 31 PPM Black
- 4800 x 1200 Print DPI
- 250 Sheet Capacity
- 35 Sheet ADF
- Up to 100 Page Out Of Paper Memory
- 1 Year Warranty

$299 | V7758

OfficeJet H470B Mobile Printer

- Print Speed: Up to 22ppm black and 18ppm colour
- Resolution up to 4800 x 1200 dpi printing
- Total Media Capacity: 50 sheets
- Weighs only 2.2kg
- Memory card slot (SD/MMC)
- USB connection and optional Bluetooth or wireless interfaces
- 1 Year Warranty

$479 | V5930

OfficeJet Pro K8600DN A3 Printer

- Up To 280gsm Paper
- Individual Inks
- Print up to A3+
- 35 PPM Black
- 35 PPM Colour
- 4800 x 1200 Print DPI
- 150 Sheet Capacity
- 12.5 PPM A3 Colour
- Network Ready
- 2 Sided Printing
- 1 Year Warranty

NEW

$799 | V7768 | RENT $7.23/wk*

GT1500 Document Scanner

EPSON

- 1200 x 2400 Scan DPI
- 40 Sheet ADF
- ReadyScan LED Technology
- 18 PPM (Using ADF)
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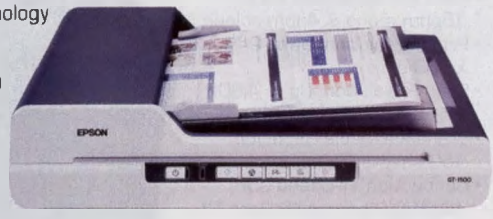
- Three-line optical CCD
- 4 One Touch Buttons
- Enhanced PDF Functionality
- 1 Year Warranty



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LIDE600F Scanner

Canon

- High-resolution scanning up to 4800 x 9600dpi, 48 bit input/output resolution
- FARE Level 3, the optimal solution for film scanning
- Automatic dust and scratch, fading, graininess and backlight correction technology
- Continuous scanning of up to 12 frames of 35mm filmstrip or 4 mounted slides
- White LED for brighter and faster scans
- 1 Year Warranty

$229 | U5466

Laser Printers Multifunction

LaserJet CM1312NFI Colour Laser MFP

- Printer/Copier/Scanner/Fax
- 7-in-1 card reader
- Print speed: Up to 12ppm mono and 8ppm colour
- Print Resolution: Up to 600 x 600 dpi mono and 600 x 600 dpi colour
- Scan Resolution: 1200 x 1200 dpi
- Connection: Hi-Speed USB, Ethernet
- Colour LCD Display
- 1 Year Warranty

$599 | V8012 | RENT $9.95/wk*
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DM1522NF Mono Laser MFP

- Printer/Copier/Scanner/Fax
- Print speed: Up to 23ppm
- Print Resolution: Up to 600 x 600 dpi
- PCL 5e, PCL 6, PostScript 3 support
- Scan resolution: 1200 dpi
- Hi-Speed USB, Ethernet
- 1 Year Warranty

$549 | V6712

MFC-7840W Wireless Mono Laser MFP

- Printer/Copier/Scanner/Fax
- Printing & Copying Speed: Up to 22ppm
- Print Resolution: Up to 600 x 600 dpi
- PC Connection: USB, Ethernet 10 Base-T/100 Base-TX, IEEE 802.11b, IEEE 802.11g
- Scan Resolution: 600 x 2400 dpi
- 1 Year Warranty

$549 | V7986

LaserJet 3050 Mono Laser MFP

- Printer/Copier/Scanner/Fax
- Print & Copy Speed: Up to 18ppm
- Print Resolution: Up to 1200 x 1200 dpi
- Scan Resolution: 600 x 600 dpi
- Total Media Capacity: 260 sheets
- Memory: 64MB
- Connection: Hi-Speed USB
- 1 Year Warranty

$499 | T4389

SCX 4521F Mono Laser MFP

- Printer/Scanner/Copier/Fax
- Print & Copy Speed: Up to 20ppm mono
- Print Resolution: Up to 600 x 600 dpi
- Scan Resolution: 600 x 600 dpi
- Memory: 16MB
- Total Media Capacity: 150 sheets
- Connection: Hi-Speed USB, Parallel
- 1 Year Warranty

$199 | T6638

MFC-9840CDW - Colour Laser MFP

- Fax/copier/printer/scanner
- Fax Type: Super G3 - plain paper
- Copying Speed: Up to 16ppm mono and 16ppm colour
- Copying Resolution: Up to 1200 x 600 dpi mono and up to 1200 x 600 dpi colour
- Printing Speed: Up to 20ppm mono andup to 20ppm colour
- Printing Resolution: Up to 2400 x 600 dpi mono and up to 2400 x 600 dpi colour
- 1 Year Warranty

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BONUS Upgrade 2 Year On-site Warranty*

CLX-3175FN Colour Laser MFP

- Printer/Copier/Scanner/Fax
- Print & Copy Speed: Up to 16ppm mono & 4ppm colour
- Print Resolution: Up to 2400 x 600 dpi
- Scan Resolution: Up to 4,800 x 4,800 dpi
- Standard Media Capacity: 150 sheets
- Connection: Hi-Speed USB, 10/100 Ethernet 10 Base-TX
- 1 Year On-site Warranty

$599 | V8309

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LaserJet 5200TN A3 Printer

- Print Speed: Up to 35ppm
- Print Resolution: 1200 dpi x 1200 dpi
- Total Media Capacity: 850 sheets
- Memory: 64MB (expandable 512MB)
- Connection: Parallel, Hi-Speed USB, Ethernet 10/100Base-TX
- Monthly duty cycle: 65000 pages
- 1 Year Warranty

$2499 | U0983 | RENT $21.80/wk*

LaserJet P2015 Mono Laser Printer

- Print Speed: Up to 26ppm A4
- Print Resolution: Up to 1200 x 1200 dpi
- Total Media Capacity: 300 sheets
- Memory: 32MB (expandable 288MB)
- Connection: Hi-Speed USB, Ethernet (embedded print server)
- Monthly duty cycle: 15,000 pages per month
- 1 Year Warranty

$699 | U4728 | RENT $6.33/wk*

LBP5100 Colour Laser Printer

- Print Speed: Up to 10ppm mono- 12ppm colour
- Print Resolution: 9600 dpi x 600 dpi
- Auto duplex for double side printing
- Total Media Capacity: 250 sheets
- 1 Year Warranty

$599 | U9214 | RENT $5.42/wk*

HL-5240 Mono Laser Printer

- Print Speed: Up to 28 ppm
- Print Resolution: Up to 2400 x 600 dpi
- Total Media Capacity: 300 sheets
- RAM Installed (Max): 16MB (528MB)
- Processor: NEC VR5500 266MHz
- Interface: Parallel, USB
- Monthly Duty Cycle: 20000 pages
- 1 Year Warranty

$299 | V1817

Colour LaserJet CP1518ni Printer

- Max Media Size (Standard): A4
- Max Resolution (B&W): 600 dpi x 600 dpi
- Max Resolution (Colour): 600 dpi x 600 dpi
- Interface: USB, Ethernet 10/100Base-TX
- Processor: 450 MHz
- RAM Installed (Max): 96 MB
- Total Media Capacity: 150 sheets
- 1 Year Warranty

$150 CASHBACK[1]

$349 | V7365

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E120N Mono Laser Printer

- Print Speed: Up to 19 ppm
- Print Resolution: 600 dpi x 600 dpi
- Total Media Capacity: 150 sheets & 15 priority sheet feed
- Memory: 16MB
- Connection: USB/ Ethernet connection
- Monthly duty cycle: 10,000 pages
- 1 Year Warranty

$129 | T7001

CLP-350N Colour Laser Printer

- Print Speed: Up to 19ppm Mono A4/5ppm colour
- Print Resolution: 2400 dpi x 600 dpi
- Total Media Capacity: 150 sheets
- Memory : 64 MB
- Connection: USB, Ethernet
- Monthly Duty Cycle: 25,000 pages
- PostScript 3, PCL 6
- 1 Year On-site Warranty

$359 | V2270

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LaserJet CM1312NFI Colour Laser MFP

$599 | V8012 | RENT $9.95/wk*

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$449 | V5035

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- Great Tough SANTA ROSA Notebook
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- Military standard 810F

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